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Psychological Bulletin

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

HISTORICAL CONTRIBUTIONS

BY WOODBRIDGE RILEY
Vassar College

Klemm's *History* (5) is the most important contribution of the year. It is different from previous histories of psychology. Unlike Baldwin it does not confine itself to the genetic development of the theories of mind; unlike Volkmann or Janet and Séailles it is not a mere compilation of historical references, but presupposes the sources. In general the book is a critical and topical study of the concepts and theories of psychology under a system of multiple entry. Each item is distributed among different persons and a final historical accounting presented. Thus the author casts up the accounts, from ancient to modern times, of theories of vision and audition, of feeling and volition. This summarizing occurs in the third and last part, the second being taken up with the development of the fundamental concepts of psychology, the first with general tendencies, especially in relation to metaphysics. The latter relation is one largely neglected in histories of the subject, but Klemm does full justice to the metaphysical framework supporting psychological theories. Thus dualism in psychology is traced from Plato to Descartes, and monism from the atomistic materialism of Democritus to the equative materialism of Moleschott, and from the spiritualistic elements in Anaxagoras to Herbart's mechanics of ideas. The chapter on descriptive psychology is not so valuable as that in Dessoir, but explanatory psychology is fully analyzed under concepts ranging from association to evolution. Particularly valuable is the account of psychology as a science, from the older and useless conceptual formulas to the modern differentiation of physical and psychical phenomena as based on exact experimentation.

Much space is given to psychical measurement, but disproportionate praise to the Germans. Thus forty references are given to Fechner, and not one to Cattell. The same disproportion obtains under theories of sensation, forty-one references being given to Wundt, two to James, and none to Bergson.

Such omissions in Klemm are made up by Kallen (4) in his study of the contrasting theories of James and Bergson, the former being presented as an upholder of pragmatic methods, the latter as the defender of intuitionism. Kallen does well in deriving James' philosophy of practicality from the *Principles of Psychology.* He might have substantiated his claim as to his master's originality by giving the original sources in the *Journal of Speculative Philosophy* of 1874.

For the sources of Bergson's thinking, we have the first authentic account given by Ruhe and Paul (10), two Swedes, who devote an interesting chapter to the life and personality of the author of *Creative Evolution.* Thus Bergson's studies in Lucretius and Aristotle, in Malebranche and Spinoza, have led to his work on *Matter and Memory*, and to his less known notes on the psychological origin of our belief in the law of causality, and to contributions to psycho-physical parallelism. There is little to show, as Kallen implies, that Bergson was under the dominance of transcendentalism. A correction might be made by Ruhe and Paul regarding the bibliography of Bergson's writings, presented to him at his Columbia lectures in 1913, for it was chiefly compiled by Wendell T. Bush.

A fault of Kallen's work is a too sharp contrast drawn between Bergson as intuitionist, and James as pragmatist. This might be toned down by referring to the scholarly history of Thilly (12) who does not consider Bergson's system as transcendental, but, along with that of James, as a reaction against rationalism and idealism. What Kallen hinted at is carried out by Knox (6) of Oxford when he shows that those very philosophical contentions of James which have been denounced as "most revolutionary" are actually contained and technically justified in the *Principles of Psychology.* So Knox seeks to present the continued unity between the *Principles* of 1891 and the *Essays in Radical Empiricism* of 1912. This is, indeed, a welcome vindication against the shallow charge against pragmatism as being "unscientific" because it refuses to see in psychology anything but an "iron system of law."

In marked opposition to all this Western speculation is Mrs. Rhys Davids's (8) *Buddhist Psychology*. It requires some mental gymnastics to abandon that "convenient Greek fiction," the traditional logic of whole and parts, genus and species, and the effort seems futile, when the author concludes that her inquiry over some twenty-three centuries of speculation shows considerable evolution in the introspective and analytical and critical power of the Indian mind, and at the same time "an unbroken current of consistently upheld tradition."

As a supplement to these larger volumes, we can but cite shorter accounts of scattered works. The aim of Murray's *Froebel* (7) is to make the pedagogist an anticipator of modern psychology. He succeeds in proving that Froebel was not a faculty psychologist, but does not disprove his being a preformationist. In presenting Froebel as a pioneer, the book confines its comparisons chiefly to the English authors, Stout and Ward, to the manifest neglect of American authors.

Some unedited writings of Leibniz (9) exhibit his attempts to subsume both the corporeal and spiritual *conatus* under pre-established harmony. Another German noted is Jodl (11), who is described as a positivist opponent of idealism, familiar not only with the literature of the French and Italians, but of "Anglo-Americans." Next there are some accounts of Chamberlain (3) as anthropologist and child psychologist, and of Pierce (2) as a student of auditory and visual space perception. Finally we have *Festschriften* on Hall (13) and Cattell (1), but *de vivis nil nisi*—.

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GENERAL STANDPOINTS; MIND AND BODY

BY WALTER T. MARVIN

Rutgers College

The biologically fundamental problem of the relations between the chemical-physical processes of the body and the physiological processes and between these latter and the mental processes continues to be a prominent subject in the current discussion of the philosophy of life and mind. In this discussion an important part is taken by the lectures delivered by Haldane (7) in the physiological laboratory of Guy's Hospital during May, 1914. His point of view is frankly Hegelian in maintaining that we are closer to concrete reality in our study of life and mind than in our study of matter. "The relations of personality, mere organism, and matter are relations of increasing abstraction from reality." Thus there is something essentially unreal, because abstract, in the biochemical study of the living organism. It leaves out the very object of the physiologist's study, namely life. "If we assume that the conception of the living organism is the fundamental conception of biology, it is clear that the aim of biology differs entirely from what it would be if the mechanistic theory were accepted. All attempts to trace the ultimate mechanism of life must be given up as meaningless. The aim of biology becomes a very different one—to trace in increasing detail, and with increasing clearness, the organic determination which the ground conception postulates. The bodily processes become nothing but the expression of organic activity." What is true of life is true throughout the realm of science: the higher cannot be explained in terms of the lower, the complex in terms of the simple, the concrete in terms of the abstract. "As the conception of organism is a higher and more concrete conception than that of matter and energy, science must ultimately aim at gradually interpreting the physical world of matter and energy in terms of the biological conception of organism." In turn, a similar statement is to be made regarding mind and personality. Man the person is not to be explained out of man the organism, for personality is a stage even nearer the concrete and the real. Joseph (10) is Aristotelian rather than Hegelian. The real antithesis to mechanism is intelligence, and the activity that we find in living things is like no other thing known to us except intelligence. Mechanical configurations do not grow or progress but rational thinking does. The organism has unity but mechanical systems do not have unity. Now in rational thinking "the result is not explicable from the laws displayed in the interaction of parts, but that something which may be called the unity, or whole nature, of the mind or the soul is at work in the very process by which it comes to fuller display." Hence "we may be inclined to think, without wishing to check any of the biologist's inquiries, that life may after all have in it as much of intelligence as of machinery." Enriques (5) also finds that mechanical explanation is irrelevant in the field of biology and arrives at the following conclusion: "In the actual state of our knowledge, the mechanical hypothesis does not appear to be incompatible with the phenomena of life, but it is unimportant for the study of these phenomena." However, the mechanical hypothesis has played an important part in the past by tending to free biology from "sentiment" and by tending "to unify scientific views." It has helped us to find in life a proper object of scientific research, and was thus of great value to modern science in the beginning of physiological research. Singer (14) defines materialism as the attempt "to make life consistent with mechanism by making life mechanical" and monadism as the attempt "to make mechanism consistent with life by making mechanism alive at every point." Now neither theory is possible for any one who seeks to discover the precise characteristics of the behavior that we call life and who then bases his definition of life upon these characteristics as actually found. From this, however, it does not follow that there is a bridgeless gap between the living and the mechanical; rather the biologist will make "it his problem so to define life that it may dwell in mechanism and be of it, but in such manner that neither shall life be turned into mechanism nor mechanism into life." That which differentiates life from the mechanical is purposive behavior, as exhibited, for example, in self-preservation. Noel Paton (12) draws the line not between the living and the lifeless but between the former and the mental. He shows that if we examine life in its simplest forms "the phenomena of living matter require no more for their explanation than do the phenomena of non-living matter." The origin of living matter, "its persistence and spread, and its reproduction and adaptation to its surroundings can all be explained in terms of physical and chemical changes." But what is consciousness? How did it arise? How does it act? "Here is a something about the relationship of which to matter and energy we know nothing and in my opinion cannot hope to know anything." "It can be regarded only as an epi-phenomenon linked to the more complexly developed living things." Thus, "the great and profound mystery is not the difference between living and non-living things, but the nature of the difference between creatures without and those with a consciousness."

Behaviorism also continues to be a prominent subject of discussion. Titchener (16) criticizes Watson's extreme behaviorism claiming that Watson is both unhistorical and illogical. Behaviorism is not new and in its extreme form it shows symptoms of both haste and impatience. Psychology and the study of behavior do not conflict, rather the one begins when the other begins and "the fortunes of the two are bound up in the same bundle." "Psycho-biology will run the same course as psychophysiology and psychophysics. It is now, I suppose, in its first phase, when pioneer work brings in gross and tangible returns. Next will come the period of revision, of elaboration of details,—a period of discouragement, perhaps, as the former was a period of elation; and then will follow the period of slow and steady progress, varied by a certain amount of wholesome interruption." Introspective psychology is now in this third stage; and it wishes the study of behavior success, but it declines "with the mild persistence natural to matters of fact either to be eliminated or to be ignored." Pillsbury (13) maintains that the definition and methods of a science and the formulation of its results must be determined by the science itself, by the actual research and not by individuals' preferences or by *a priori* principles. "There is room in psychology for the greatest variety of standpoints and for all methods provided only the spirit of live and let live prevails." "In the light of the tests so far available it seems to me that defining psychology as the science of behavior and the use of all methods possible under suitable precautions will lead soonest to the end of psychology, the discovery of mental laws and their explanation." Holt (8) endeavors to define behavior precisely distinguishing it from mere reflex action. "Behavior is any process of release which is a function of factors external to the mechanism released." Prior to integrated response there is not found the genuine "objective reference" to the environment present in behavior. The object of behavior is the object of consciousness; and this object is a *fact* which the behaviorist is in danger of ignoring, committing the error of the materialist in denying the *facts* when he means to deny only the *theory* of consciousness. The behaviorist is liable to err in this way because in his analysis of a response into its reflex components he neglects "the equally important relations in which they are organized," in other words, their integration.

Of all the publications of the past year the most elaborate study of the philosophical foundation of psychology is that of Ziehen (17). His philosophical position is quite similar to the position of the so-called immanence-philosophers. The Given, that is, the world of sensation and of ideation is ultimate and therefore cannot be transcended and cannot be brought under any higher concept such as the mental or the physical. Rather it is within this world that man has come to distinguish these two fields of existence. This conviction leads him to deny any ultimate dualism between mind and matter and to assert only a double system of relations within the Given, "a binomy," which constitutes the distinction between the mental and the physical. The task of psychology is to investigate the two types of data found within the Given in order to ascertain "their parallel components," a technical term which Ziehen defines only after elaborate analysis. He defines more precisely his "association-psychology," he denies a psychical causation affirming instead only what he calls a functional relation, he analyzes the nature of introspection, he discusses at length the subject of methodology, and his book includes also a study of many other fundamental psychological matters.

The doctrine that psychology is the science of the self, also has been a point of attack and of defense. Calkins (1) comes again to its defense by showing that a scientific introspection does not fail to discover the self. Her problem is two-fold: "First, is the fact as stated; have scientific psychologists really found no trace of a self? Second, if the fact be admitted, is the failure to produce a self due to the inadequacy of the methods or to the non-existence of the self?" Curtis (2) attacks Miss Calkins's claim that psychology is "most naturally, consistently, and effectively treated as a study of conscious selves in relation to other selves and to external objects." Rather the self and its characters as represented by Miss Calkins could be arrived at without psychological training merely by logical inference. Finally, her claim that psychologists are unconsciously self-psychologists reduces to the fact that they use the personal pronoun. Nearly the same as the standpoint of the self-psychology is the standpoint of Strich (15). Psychology is to be kept in closest relation with the spiritual and cultural ideal of mankind as it is working itself to expression in man's history. Psychology is not a natural science but an appreciation of the individual and his ideals. The best psychologist is he who knows best the world and man, for the true object of psychological study is *man, the maker of history.*

The relation of psychology to philosophy is discussed by De Laguna, Eisenmeier and Goblot. De Laguna (3) quarrels with the attitude of the typical psychologist who endeavors to escape any epistemological responsibility. "The problem of meaning" is a real problem and the psychologist in attempting to describe mental life "in disregard of meaning" gets into theoretical difficulties within his own science. Two of these difficulties are: first, in endeavoring to substitute temporal process for substantial entities the psychologist has hypostatized process; second, he has conceived of ideas as capable of behavior, or as potentialities. Eisenmeier (4) endeavors to show that the standpoints, "psychology without philosophy" and "philosophy without psychology" are untenable. All the philosophical disciplines have in psychology their common starting point. "Psychology is their central discipline." On the other hand, psychology has received from philosophy her strongest interests and impulses. Goblot (6) finds the problem of logic to be psychological. This problem may be worded as follows: What are the forms and processes of an intellectual activity separated and subtracted from the influences of emotion and will? The solution of this problem gives us only "the *natural laws* of a pure intellect." "It is because a *pure* intellect is only an abstraction that these laws seem anything other than natural laws and that logic appears to be other than psychology."

Two studies bearing upon the doctrine of parallelism are those of Hurwicz and Minkowski. Hurwicz (9), though admitting that the psychical is indeed not identical with the physical, finds Wundt's principle that the two are "absolutely incomparable" false. One instance of a factor common to the physical and the psychical is the feeling-tone as seen in association by similarity where the causal action of the physiological factors are to be found directly in the train of thought itself, and therefore where the mental states cannot be explained exclusively in terms of psychical causality. In a long article consisting of three distinct studies Minkowski (11) devotes the first to a careful analysis of the doctrine of psychophysical parallelism. The second and third are analytical studies respectively of memory and Hering's color theory. In them the author gives the bearing of his results upon the doctrine of parallelism. One of the matters emphasized is the distinction between physiological memory (*e. g.*, as expounded by Semon) and psychological memory.

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CONSCIOUSNESS AND THE UNCONSCIOUS

BY H. W. CHASE

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What, in the behavior psychology, becomes of the object which the subjectivist describes as content of consciousness? Holt (4) in his attempt to answer this and related questions, is led to define behavior as "any process of release which is a function of facts external to the mechanism released." Behavior is always integrated response, never simple reflex action. It is a constant function of some aspect of the environment. Now this aspect or object of which the behavior of the organism is a constant function is identical with what for orthodox psychology is the content of consciousness. The more integrated the behavior, the smaller is the part played directly by the stimulus as such, and the wider the aspect of the environment of which behavior is a function. Since complicated integrations are built up out of simpler, the level of personal awareness will always have as its "content" the object of which the most inclusive integration operative at a given time is a function. Lower elements in such a hierarchy will be co-conscious, subconscious or unconscious, but since ultimately they, too, are functions of objects, they cannot be spoken of in terms of brain reflexes or unconscious cerebration. That which knows is, in such a theory, not an *anima*, but the body, unified by the nervous system, as that which responds to external objects. The principle of unity is to be sought not in such a permanent Ego as the subjectivists have postulated, but in successful and inclusive integration. It is thus attained, not innate. Where integrations are thwarted, such unity is not attained, with results of which the whole psychology of Freud is a discussion.

Herrick (3) deplores the present tendency toward the neglect of consciousness in psychology, since it seems to be a positive biological factor in evolution, and a true cause of the modification of behavior in the individual. Jones (5) finds the root of difficulty with the conception of consciousness in inadequate definition. The traditional dualistic doctrine, regarding consciousness as an entity, has been revealing itself more and more as unsatisfactory, and must be abandoned. More hopeful is the drift toward regarding consciousness as a function of the organism. This conception simplifies both practical and philosophical difficulties, and at the same time does not affect, save in the synthesis in which they are considered, the facts which make up the content of psychology. With such a view of consciousness both structuralist and behaviorist may be content. Behavior then becomes the quantitative, structuralism the qualitative, interpretation of consciousness.

Le Dantec (1) argues for an epiphenomenal view of consciousness, which is really the property which an organism possesses of being aware of its actual structure, or a part of this. Inorganic matter must be endowed with elementary forms of consciousness. Draghicesco's papers (2) present the view that consciousness is socially conditioned, in its origin and development. Suffering, especially through the agencies of war and religion, has been the main factor in its growth. As socially conditioned, consciousness should be studied by the sociologist, possibly not at all by the psychologist.

Windelband (8) uses the familiar arguments to demonstrate the existence of a mind wider than the field of consciousness. In particular, the phenomena of meaning and of the *a priori* are appealed to as being explicable neither in terms of consciousness nor of unconscious cerebration. Martin's interesting experiments (6, 7), after some preliminary work which showed that images apparently function less in thinking than is usually held to be the case, deal with the investigation of subconscious processes through the arousal of voluntary and involuntary images on the part of the observer. Spontaneous images arose not only when the observer was set for them, but also when his task was to arouse voluntarily a definite image. These often come more quickly than willed images, and from their character it is possible to make certain inferences regarding the nature of subconscious mental activity. This is not essentially different from that which goes on in consciousness. Material is not only retained, but may undergo on the subconscious level rather elaborate re-organization. Individuals differ very greatly in the abundance and variety of such spontaneous images, which again may either help or hinder voluntary thinking. This method of investigation seems to the author better designed to give systematic, possibly quantitative results, than any other which has yet been tried.

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DREAMS

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The literature of dreams is still largely concerned with Freudian implications and deprecations (1, 4, 5, 7, 9). The most ambitious work done in the study of normal dream and sleep is that of Shepard (8). The major portion of this two-year investigation was performed upon two subjects the previous trephining of whose skulls made brain-plethysmograph curves possible. The author asserts that sleep is a mental process, controlled by conditions similar to those which control attention generally. When we introspect (and thorough introspections of the subjects were always taken), we find sleep to be a "yielding to a heaviness," sensations of fatigue which tend strongly to inhibit other processes. The inhibition of skin sensations and auditory sensations is effected last of all. When these sensations of fatigue are yielded to we get sensations of "rest." The content of sleep, then, is a group of sensations of "rest." The curve of sleep, which shows the maximum intensity in the early hours of the night followed by a rapid rise and then a more gradual rise toward awakening, may be explained by the fact that enough waste product is thrown off after the first few hours of sleep to reduce the actual stimulation of fatigue sensations and thus lessen their dominance in attention. When attention is dominated by these sensations of rest, which tend to inhibit all other processes, those processes which do arise and constitute dreams, form the "fringe of consciousness" and tend to disturb sleep, but are not an organic part of it. During sleep there appears to be an effective vaso-motor control of brain-vessels in man by a system of vaso-motor constrictors, the center of control of which is in the medulla. The changes in brain volume were found to be due to blood pressure, not to venous congestion. Finally study of the pulse-form in the brain showed that with sleep there is a relaxation of the brain vessels, and that active constriction accompanies awakening.

R. Weber (**10**) finds pathological evidence for agreeing with Koehler and others[1] to the effect that during the day visual imagery is secondary, auditory imagery primary, but that at night in dreams the very reverse is true. In alcoholics auditory hallucinations are frequent while visual hallucinations are infrequent, thus following, as it were, the law of day-imagery.

The Great War may be expected to widen our dream literature. Dr. Crile, a surgeon in charge of a hospital in France, writes of the soldier's dream-life as follows (**6**): "The harmony of the sleep of the exhausted soldier has but one discordant note, and that is the dream of battle. The dream is always the same, always of the enemy. It is never a pleasant pastoral dream, or a dream of home, but a dream of the charge, of the bursting shell, of the bayonet thrust! Again and again in camp and in hospital wards, in spite of the great desire to sleep, a desire so great that the dressing of a compound fracture would not be felt, men sprang up with a battle cry, and reached for their rifles, the dream outcry startling their comrades, whose thresholds were excessively low to the stimuli of attack. In the hospital wards battle nightmares were common, and severely wounded men would often spring out of their beds. An unexpected analogy to this battle nightmare was found in the anæsthetic dreams. Precisely the same battle nightmare that occurred in sleep, occurred when soldiers were going under or coming out of anæsthesia, when they would often struggle valiantly,—for the anæsthetic dream like the sleep dream related not to a home scene, not to some dominating activation of peaceful days, but always to the enemy, and usually to a surprise attack."

That the ordinary recital of a dream, even though accurate and faithful, is not a true introspective description, is claimed by Bentley (**3**). To get at the latter his observers were given an outline to aid in the introspective analysis of their respective dreams, bearing such captions as "associative formations," "mental functions," "dream emotions." A series of arousals, with the time unknown to the subject, were arranged, so that dreams might be caught in transit. Results from five subjects showed that visual and auditory processes were far more frequent than kinæsthetic or auditory-kinæsthetic processes; unpleasantness was twice as frequent as pleasantness. Conscious attitudes were reported as significant in fifty-four dreams, but the writer attributes most of them, *e. g.*, attitudes of worry, to the dimly appreciated task of reporting, and not to the dream events themselves. Dream emotions, on the other hand, spring directly from the scenes of the dream. Dreams frequently radiate from persistent topical centers; perception is the most usual mental function noted. Memory of past events *in the dream*, was never present in this investigation.

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[1] See review of dream literature in the BULLETIN for January, 1915.

Bellamy (2) suggests a reason for the fact that certain portions of a dream are dim, without going to the doubtful process of positing a repression, as the Freudians do. His thesis is that only those things appear in a dream which are necessary to express the meaning of the dream. He writes: "I have examples in abundance which go to indicate that taste, smell, tactual, kinæsthetic, color sensations, or any other kind, will appear in a dream when they are called for to complete the meaning of the dream, but they are not common because they are very rarely needed."

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TERMINOLOGY

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Ruckmich (3) gives a much-needed analysis of the various connotations of the term *method* in scientific work. Not only is this word used in several senses, but he finds that several kindred words "are often used in the same contexts with differences of meaning which are difficult to analyze." Thus *method*, *procedure*, and *instrument* are sometimes used interchangeably. This looseness of diction is not confined to English: in German the terms *Methode*, *Verfahren*, and *Hilfsmittel* are similarly confused. Ruckmich finds four distinct uses of the word *method*, which he proposes to differentiate as follows: (1) *Method*, to be applied to "a general mode of investigation"; *e. g.*, method of experimentation. (2) *Procedure*, "a specific type or order of procedure for purposes of control or treatment"; *e. g.*, procedure of average error. (3) Point of view;—"the point of view taken or the intention assumed in an investigation"; *e. g.*, comparative point of view. (4) Rational principle, "the form of reasoning involved in the pursuit of any of the preceding types of operation, or in the systematization of the results obtained"; *e. g.*, principle of generalization.

Following out a problem suggested by Ruckmich's recent paper on the psychological use of the term *function* (noted in this summary in 1914), Dallenbach (1) investigates the historical origin of its application to mental data. He attributes the appearance of the new term in psychological literature to the influence of Gall and the phrenological movement. It apparently was not brought over directly from physiology. Early writers employ the terms *power* and *faculty*. There is no unquestionable instance of the use of function in its modern psychological sense prior to Thomas Brown. The phrase *mental function* and its variants are found quite extensively in Lewes and less frequently in Bain. The present-day usage was fixed by James, who "differentiates sharply between the structural and the functional aspects of mind."

Two more installments of the *Vocabulaire philosophique* (2) have recently been issued which embrace more psychological material than usual. Of special interest to the psychologist are the definitions of Psychique, Psychose, Psychologie, and compounds of the latter (comparée, individuelle, pathologique, Psychoanalyse, etc.). "The term psychology includes several distinct studies, which should be separately defined." These are (1) behavior, "psychologie de réaction," (2) consciousness, "psychologie de conscience ou de sympathie," (3) reflective or critical psychology, and (4) ontological or rational psychology; finally (5) in a concrete sense the term is applied to "the totality of mental states and dispositions of a being or class of beings," *e. g.*, the psychology of an artist or statesman. Among other terms having psychological implications may be noted Personnification, Phénomène, Plaisir, Projection, Questionnaires, Réaction, Réflexe, and Rythme.

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INTRODUCTION AND GENERAL METHODS

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The claims of the behaviorists are discussed in three articles. Pillsbury (10) prefers to define psychology as the science of behavior, thus best avoiding any implication that the object is a peculiar kind of entity or force, but asserts that this alteration in the description need not alter "the treatment of the subject as ordinarily presented"; in fact the character of the existing science determines the definition of it. Any method which gives results is to be accepted. Introspection has given most, but "observation," the method of the behaviorists, is required for the study of many processes which have little or no consciousness: it should be admitted, however, that consciousness is "an essential determinant of behavior" (p. 377). We should broaden the term consciousness, and should "include in consciousness and among ideas the fundamental states upon which all effective mental life depends. More immediate than the image, more certainly made out than any slight movement, is the series of assurances that we have that certain events, subjective or objective, take place. We know that we recall, we are sure that we recognize, believe, see objects," (p. 379). These are "the primary facts of mental life," "the fundamental reality." Experiments, statistical methods, etc., permit the discovery of the laws of these processes. But whether one is to use introspection or observation as the method of psychology is a question which arises only when one seeks an explanation of mental laws, not while one is discovering them. "For this explanation introspection, observation, and speculation on the basis of both and of knowledge obtained from all related fields can, I believe, all be used to advantage" (p. 379). The primary facts of the mental life are themselves obtained probably partly by introspection, partly by observation, and partly by experiment added to these. Jones (8) advocates the functional and relational view of consciousness, as opposed to the subjective and dualistic view. Consciousness is "just an attribute or function" of the physical organism: one is "as little body and knower as . . . body and walker" (p. 467). Introspection is "just a special form of ordinary knowing," in which "attention is . . . chiefly directed away from the nature of things as they are in themselves, which is the usual concern of men, to the character of the knowing process itself, and to the changes in content that are correlated with it" (p. 468). Behaviorism is needed, as a chiefly quantitative "interpretation of consciousness," but structuralism is also needed, as chiefly qualitative. Herrick (7) holds that "conscious processes are biological realities," and that a description of them can be obtained only by introspection. But, since consciousness is apparently a causal factor in behavior, a study of behavior is also required, to give knowledge of the function of consciousness.

The doctrine that psychology should be essentially a study of selves is attacked and defended. Against Calkins self-psychology Curtis (4) objects that the concept of the self is left obscure; that, while a distinctive method is claimed, the only such method specified is "reflection," which is of logic rather than of psychology; that the problem stated for this psychology—to understand and interpret as well as to describe—is rather one of metaphysics or of logical analysis than of scientific observation; and finally that statements concerning the self are not based on verifiable experimental observations. Gamble (6) defends self-psychology at least as coordinate with structural psychology. "Self." is an indefinable for the first, as "experience" is for the second. The self is not found by reasoning: it is found "not *by* introspection, but *in* introspection" (p. 196). It is possible to be immediately conscious of the self; but "this form of awareness . . . is not like any other"; "the self can have itself as an object, but not as subject matter for introspection in the standard sense" (p. 197). Introspection, as attention under instruction and report, is inadequate for study of affective experiences *e. g.*, and cannot be claimed as the only valid method of psychology. Reflection, in Calkins's definition, is not a logic-process but is retrospection. Self-psychology is important less for discovery of facts about the individual self as such than for giving a basis for social psychology; and the relation of self to self may turn out to be open to "the semi-experimental method of 'controlled introspection'" (p. 200). Calkins (3) also writes in defense of self-psychology. Only in a limited sense can experiment be called a method of psychology, and it is in any case not a satisfactory method for obtaining knowledge of the self, which is unemphasized in perceptual and imaginative experiences. The self is never missing from any experience, however, and is therefore harder to isolate in attention. Introspection, in essentially the meaning given this term by such structuralists as Titchener, is the characteristic method of self-psychology as it is of structural psychology. "The self can have no status in scientific psychology unless it can be discovered by this method" (p. 505) when used by competent persons. And reports are quoted to show that systematic introspection under the best controlled conditions, "experimental introspection," does in fact find a direct experience of self.

Dealing also with introspection, De Sarlo (5) emphasizes the limitations of this method, and of quantitative study of mental facts. Introspection is an essential method of any psychological investigation; but the data so obtained must be also interpreted: there are probably other "manifestations of spiritual activity" which are not to be found by introspection but which may be inferred as necessary conditions of what is found. Bonaventura (2) finds there are several types of inherent introspective ability. In memory he considers that three factors determine the subjective certainty: memory proper, automatic reconstructive activity, and "introspection," which is an "assertion of the personality" as superior to this mechanism. When this third factor is weak there is illusion of memory, as, *e. g.*, in suggestion.

The term method is used in psychological literature, Ruckmich (12) finds, in four meanings, for each of which a distinct term is suggested, thus: a general mode of investigation (method); a specific type or order of procedure for purposes of control or treatment (procedure); the point of view taken, or the intention assumed, in an investigation (point of view); the type of reasoning involved in any of the three preceding forms of operation, or in the systematization of the results obtained (rational principle).

In other writings which may form a miscellaneous group under this topic: Russell (13) develops the use which scientific method must make of recent improvements in the theory of logic. Poincaré (11), in German translation, discusses the mental processes by which important discoveries of scientific theory are made. Kelly (9) defines three kinds of directly comparable measures. Barrett (1) finds the method of paired comparisons not superior to the order of merit method. And Spearman (14) is inclined to hope a new era in psychology may date from the practical demonstration, by his formula, that "the theory of the two factors" in mental performance is correct.

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THE SELF IN RECENT PSYCHOLOGY[1]

A Critical Summary

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There has been a distinct renaissance of the self in experimental and systematic psychology during the last few years. The following pages present a résumé of some of the recent contributions to the literature of "self psychology."

I. The disclosure of the self through experimental study will be briefly treated, since a detailed summary of much of this experimental work has recently appeared (5). (*a*) A suggestion of one of the self psychologist's distinctions between perception and imagination is found in Anna Berliner's experimental study of the ability to distinguish perception from imagination (2). She finds that her subjects very often distinguish the "objective" from the "subjective" on the ground that it is forced upon them, is independent of their will (p. 103).

(*b*) Katzaroff experimented on recognition (13) by showing his subjects drawings which sometimes resembled, and again varied from, a series of drawings previously shown. He reports that, for his subjects, recognition is characterized by a "feeling of familiarity," and this he defines (p. 78) as "connected with the very feeling of our 'self' and . . . enveloped by" it. This result is unconfirmed by the "Experimental Analysis of the Process of Recognizing" made by Dr. Elizabeth L. Woods (23). Miss Woods not only repeated Katzaroff's experiments, in the Clark University psychological laboratory, but "devised a genetic method" of her own, choosing novel materials and teaching them to her subjects, and "taking an introspective cross-section of the recognitive consciousness at numerous levels." She finds that "awareness of self is not a necessary component of recognition" (p. 375) since it is only rarely, though sometimes, present (pp. 338, 374). The writer of this notice none the less believes that the rarity of these reports of self-awareness is perfectly reconcilable with the supposition that Dr. Woods's observers invariably had in their recognition the consciousness of "same self then as now." For, as has elsewhere been argued (5), the constancy of the experience of self makes for inattention to it; the preoccupation of the introspectors with structural content, *Aufgabe*, and changing experimental process, crowds this consciousness of self still further into the background; and the conventional categories alike of 'structural' and of 'functional' description provide no terms for recording the awareness of self. In truth, the fact that Dr. Woods lists the consciousness of self among the "structural components of recognition" (pp. 370, 373), and as coördinate with "sensory components" and "affective toning," indicates on her part an entire misconception of what the self-psychologist means by consciousness of self. In the opinion of the reviewer, Dr. Woods's analysis of recognition should be studied for its notable contributions to the understanding of the recognitive process; and should be considered as counting neither for nor against the assertion that recognition is awareness of persisting self.

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[1] The first of the 'general reviews' under this heading appeared in the Bulletin in January 1912. The present article takes note of a few publications of earlier date which were not named in that paper.

(*c*) The other experimental studies concern volition. Michotte and Prüm (16), in the laboratory at Louvain, studied decisions to perform one of two indicated (and unexecuted) arithmetical operations. They find that choice includes, in addition to kinæsthetic consciousness, frequent verbal images and affective experience, a "consciousness of activity" radically different from the feeling of muscular activity and "leading directly to the affirmation of the intervention of self." Ach (1) experimented not on choice but on simple volition. His specific problem was to compare the strength of volition with that of habit gained through frequent repetition. After his subject had learned series of rhymed, of reversed, and of "normal" syllables, the odd-numbered syllables were presented and the subject was directed to respond with a syllable of definite type in place of the syllable already learned. Ach's study of the introspection of his subjects leads him to enumerate four phases of volition, of which the most important are the consciousness of the end or purpose which "I" am to perform and the experience of self-activity. The self, according to Ach, is always experienced (*erlebt*) and not merely inferred in volition.

II. "Differential" and "social" and "euthenic" psychology always treat of the self whether implicitly or explicitly. Yerkes and La Rue (24) formulate a detailed questionary on "the ancestry, development, and present constitution" of the individual human being under the title "Outline of a Study of the Self." F. Giese (12) critically summarizes the doctrine (ancient and modern) of the temperaments, as basis for his exposition of the advantage of the "correlation" method of studying individual psychology. He clearly conceives as the aim of psychology "to comprehend man as personality" (p. 121, *et al*). Lévy Bruhl's study of "Mental Functions in Inferior Social Groups" (14) leads him to the conclusion that the primitive consciousness essentially consists in the feeling of being "surrounded by an infinite number of beings . . . a multitude of spirits with more or less well-defined personality" (p. 63); and he finds the key to primitive beliefs and customs in what he calls participation, the unity which the primitive man experiences between himself and the people, animals, and objects which surround him—with the dead no less than with the living.

In his recent book on "The Foundations of Character," a study of individual psychology in its ethical bearings, A. F. Shand (20) throughout presupposes the feeling and willing self and occasionally names it. For the most part, however, as he specifically admits (p. 64), he abstracts and isolates "the systems of the emotions and sentiments . . . from that mind or self to which they belong." This failure to treat the emotions and sentiments as "attitudes of the mind or self" is directly responsible for some of the gravest defects of Shand's discussion, both the close verbal likeness to faculty-psychology which results from personifying the mental attitudes and also those hap-hazard enumerations of forms of emotions on which I shall comment a little later.

III. The experience of self is avowed, during the last few years and months, by many other psychologists in many connections. Yerkes and Pfander (19) treat the self as basal fact of experience. C. S. Myers (17), in a discussion of sense-intensity, asserts that "the self is involved" in "acts of apperception, thinking, willing, imagining, etc." (p. 153). Meumann (15), though he is specifically discussing the will, says that "our whole soul-life is analyzable into a sum of intellectual processes . . . which, however, possess a distinctive character through their immediate relation to the *I*" (*op. cit.*, p. 351).

From these and others, who assert that we experience the self, are to be distinguished those writers who seem to hold that the self is a necessary assumption of the psychologist. E. Dürr's description of the self (8) as "*das die Vorstellung Habende*" (p. 228) and as "*die Dauerbedingung psychischer Geschenisse*" ranges him with this group though, on the other hand, he seems to treat recognition as direct experience of self (p. 243). Dunlap (9) also regards the self as "an essential presupposition of psychology." Bloch (3) opposes the doctrine of Lipps according to whom the self is experienced in emotion solely. Bloch rightly holds that "the consciousness that 'I' am sorry" occurs in no radically different way than the consciousness that I am sensationally conscious. Yet he concludes (p. 103) that the self is known not immediately but "in reflection." Natorp's position, also, is ambiguous (18). His teaching that the "I" is the "ground and assumption of all psychological problems" but that the "content," not the "self," is object of psychology (p. 33) indicates that he regards the self as merely inferred to exist; but on the other hand, he unequivocally teaches that the self is immediately experienced (p. 23); he emphasizes the necessity of a "subjectifying" psychology (chap. V., *et al.*); and he vigorously criticizes the conceptions of consciousness as complex of psychic forces (pp. 256, ff) or as series of psychic events (pp. 259, ff.).

It is a far cry from Natorp and Ach to John Stuart Mill, yet it is certainly appropriate to mention in this connection a recent paper by Else Wentscher which contrasts Mill's conception of the external world with his conception of the self. The conclusion of Fräulein Wentscher's analysis of these conceptions (22) as found in the "Logic," the "Examination of Sir William Hamilton's Philosophy," and in the Notes to James Mill's "Analysis of the Human Mind" is best given in her own words: "We must," she says (p. 336), "state the remarkable fact that Mill who is so convinced of the strength of associationist psychology that he seeks to solve the problem of the external world by its aid, abandons it in the case of the most fundamental psychological problems, because he has found it inadequate. His investigation of psychical phenomena, in particular of recognition and expectation, convince him that the psychic facts compel us to conceive (*aufzufassen*) them all as experiences of an *I*, permanent in change, a subject identical in all its phases" (p. 338).

IV. This review of current discussions of the self would be culpably incomplete without reference to two recent criticisms of self psychology. The first occurs in the recently published volume in which Ziehen (25) fits out a rather old-fashioned associationistic Humian psychology with an up-to-date wardrobe of epiphenomenalistic theory, structurally analytic method, and arbitrary mathematical symbolism. The book is full of rewards, in the shape of good criticism and suggestive illustrations, for readers who will master the difficulty of some parts of it. Chapter IV is devoted to a criticism, in part well-founded, of the concept and of the alleged characters of the "Soul." One significant form of soul-theory, in Ziehen's account of it, asserts that there is a directly experienced soul, thereby virtually identifying soul and self. Ziehen opposes this view, first, by asserting that many agree with him in denying such direct consciousness of self, and by throwing the burden of proof on those whose introspection disagrees with his (p. 120), and second, by attributing either to the brain or to the mental process the experienced characters which are commonly attributed to the self. Thus the 'individuality of the self,' according to Ziehen, is the distinction of one brain from another; self identity reduces to the relative stability of brain phenomena; unity is a given character of series or complexes of mental phenomena. One does not need to be a self-psychologist to remark that Ziehen's argument is based on the unargued and untenable assumption that psychical phenomena are to be defined purely in terms of their passively parallel relation to physiological phenomena.

The paper of Dr. J. N. Curtis (6) is more limited in its reference than Ziehen's chapter. Her very detailed criticism is directed against the work of a single self-psychologist, the writer of this notice. Some of her criticisms apply only to this one particular form of self-psychology, some—as is pointed out by E. A. McC. Gamble in her "Defence of Self-Psychology" (11)—merely elaborate difficulties common to all forms of psychology. In particular, Miss Gamble shows that the self-psychologist can no more reasonably be challenged to produce a definition of self than his critic to produce a definition of consciousness. One, however, of Miss Curtis's criticisms may well be laid to heart: the reproach against self-psychology for discussing "only the topics familiar from structural psychology." It will be noted that the self-psychologist is not, by these words, condemned for treating the topics common to all psychologists—sensations, affections, reactions and the like—but for dealing merely with these topics. And in truth self-psychologists frequently assert a self without using it; they employ exclusively the descriptive categories (essential, but by themselves inadequate) of "selfless" psychology; they fail to distinguish the different attitudes of self—receptive, active, sympathetic, non-sympathetic and the like—to its environment, personal and impersonal; and they ignore the description, ready to their hand, of perception, thinking, and volition as social experiences. Even when experiences are described in terms of self-psychology, the fundamental character of these principles of distinction may be ignored. So Shand and McDougall, for example, stress the self-regarding and the self-abasing attitudes but seem to be unaware that these are fundamental characters of instincts, emotions and activities and that all forms can be grouped in one of these two great classes.

But while, in the case of most self-psychologists, the justice of this criticism must be admitted, full right of way cannot be given to it. For there certainly exist the beginnings of a systematic self-psychology. Alexander Pfänder (19) has presented a clear outline of self-psychology in his *Einführung in die Psychologie.* (The writer of this notice who has only within a few months become acquainted with Pfänder's work, is greatly impressed by the similarity between his systematization of self-psychology and her own attempt in the same direction (4).) Pfänder unequivocally conceives psychology as science of the psychic individual, or self. "We can not," he says, "conceive even a sensation without thinking in it a sensing, psychic subject." Among the characters of this subject, or I, he enumerates "the identity of the experiencing I" (p. 197), its "ceaseless change" (p. 188), and its uniqueness (*eigentümliche Einheit* (pp. 203 ff.). This 'I,' or subject, he continues (p. 207), stands in a relation to the perceived or imagined object (*Gegenstand*) which is comparable to the relation of center to periphery. Pfänder is at great pains to make clear that no 'epistemological reflections,' are introduced into his conception of 'object.' He refers by the term to something entirely different from the so-called 'content' (p. 208). In fact, he takes 'object' in its most general, every-day sense to include material objects, past and present, relations between things, psychic objects—other men and their experiences, and all objects of imagination. The relation between the self and these objects is a *Wissensbeziehung* and there are several forms of it differing according to the nature of the object and the *Tätigkeit* of the subject. Seeing and hearing, for example, are special kinds of *Wissensbeziehung.* In addition to this consciousness of objects every subject has feelings of like and dislike, in which it is primarily conscious of its own condition (pp. 228, ff.), and also has activities (*Strebungen*, pp. 244, ff.) which are distinguished alike from the merely receptive awarenesses of objects and from the emotional experiences of the self in its inactivity.

Limits of space forbid either a summary, in greater detail, of Pfänder's work or more than a bare mention, in this connection, of G. A. Coe's paper (7) on Mental Functions. But it must expressly be noted that evidences of a working out of self-psychological categories are found not only in the writings of general psychologists but in experimental and pathological studies. Michotte and Prüm (16), already summarized, distinguish admirably not only between will directed to the future and non-temporal will, but between the assertive and the loyal (or, as they call it, the passive) forms of will. And Ach (1) differentiates the consciousness of willing from that of obedience on the one hand and of obligation on the other, according to the varying degrees of the self-activity and consciousness of reality involved.

Similar suggestions toward classification, in terms of self-psychology, may be gained from Frederic L. Wells's "The Systematic Observation of the Personality" (21). Dr. Wells definitely conceives psychology, from the standpoint of the psychiatrist, as study of the 'adjustment of the personality to its environment' (p. 295). The data for a study of personality are to be used statistically and consist in 'comparative judgments' of the quantitative relation of the subject to other individuals (pp. 295–296). Especially significant are Dr. Wells's distinctions between forms of self-assertion (p. 303), between types of adaptability (p. 304), and, finally, his discussion of moods (p. 311) and of the 'attitude' of a self toward himself (p. 313) and toward other selves (p. 314). But the mention of Dr. Wells's contribution opens up a subject so large that it cannot here be considered: the important place of the self in the psychology of abnormal experiences. This paper must close accordingly with the barest mention of Claparède's paper (6) in which the author concludes, from the study of a pathological case and of instances of post-hypnotic suggestions, that the inhibition of 'egocentric associations' checks recognition.

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TEXT-BOOKS AND GENERAL TREATISES

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In his two volumes Ziehen (11) has covered concretely, clearly and in the conventional academic fashion all the important principles involved in psychology. It is what one generally terms the philosophy of psychology. The first volume is concerned with the epistemological, the second with the psychological principles.

Not its least valuable part is that devoted to a discussion of the numerous theories bearing upon the points under consideration. Much attention has been given to their classification with the result that many subtle differences between them are disclosed. Although the author is not extremely radical, yet he always differs in some degree from existing opinions. This is necessitated in great part by his rather unique conception of the relation of subject and object. He rejects both interaction and psychophysical parallelism and substitutes what he terms binomism. He starts from experience (*Das Gegebene* or *Gignomena*). This is neither mental or physical. From the *Gignomena* are reduced (*Reductionsbestandteilen*) the stimuli and the brain processes. These two stand in a twofold relation to each other—a parallel and a causal. Physiology is concerned with the latter relation, descriptive psychology with the former. A descriptive account of mental phenomena without reference to stimuli or brain is in Ziehen's terms a treatment of the *Gignomena* in respect to their parallel relationship and this method is the one followed in these volumes. In principle, however, psychophysics and psychophysiology are not excluded from modern psychology. Through them laws are derived which are as exact as those of the natural sciences. A short history and criticism of experimental methods with special reference to the nature and value of introspection is given.

The mental phenomena can be reduced to two components—sensations and images. From a genetic viewpoint sensations are considered primary. They are transformed through certain functions or processes to images. These processes are specific parallel reactions or energies analogous to the specific nervous energy. In the degree of vividness is found the distinctive difference between sensation and image. Feeling tones develop as secondary processes of these. They are classed as attributes of sensation, although it is admitted that the term as here employed is not quite that of conventional usage. In this connection Stumpf's theory of feeling sensations and Külpe's theory of feeling are criticized at length. From the feelings are developed the emotions and temperaments, according to the author's laws of radiation and fusion. In the lengthy account of concepts and judgments it is shown how sensations and images and their special relations are sufficient to explain the more complex phenomena without the aid of imageless thought. Through the simultaneous combinations of images are developed the general concepts and the products of comparison, imagination and speculation and through successive combinations the various logical judgments. The will is treated empirically according to the results of recent experiments. Both a special act and a determining tendency are denied except in so far as they are physiological processes. It should be added that Ziehen does not admit a subconscious in his system.

There is a large section devoted to a discussion of Brentano's and Stumpf's separation of act and content with which Ziehen disagrees. As an example of the author's general treatment may be mentioned his association theory. The choice of the ideas is dependent upon the causal processes of the brain, the meaning of their connection upon the parallel relationship.

Thus far we have been describing principally the contents of the second book. The first is concerned with the nature of the soul, the concept and unity of the ego, mental substance, and the concept of consciousness especially as a fundamental characteristic of mental phenomena. There is also a large section upon the relation of psychology to logic and ethics.

Givler's book (4) is an attempt to teach a psychology in complete accord with the principles of a realistic philosophy, as developed by Professor E. B. Holt, to whom the author acknowledges his indebtedness and from whose books he has quoted at length. Nevertheless the book shows the marked originality of the author. Although it is a polemic against mysticism, faculty psychology and such like obstacles to the development of an exact science, the author intends it as a text-book. He confesses, however, that it contains many gaps which will have to be filled in by the lecturer. He has striven for a most radical departure from the conventional text-book and in this he has been eminently successful. Over half the book is devoted to the chapter upon "The Sensitive and Perceptive Organs." The attributes are divided into essential, such as quality and intensity, and inessential, such as after-images, fusion and contrast. These different attributes are described and explained at length and then the special senses are treated separately. Of the perceptions, that of space has interested the author most. There are also some remarks upon the value of introspection, and the chapter closes with an account of the nature of speech and language. Here and there are interspersed rather detailed accounts of experimental work such as that of Head upon cutaneous sensations. A chapter upon "The Emotional Complexes," probably the best of the book, opens with a definition of emotions and instincts as "motor responses to disordered situations." In the last chapter, entitled "Matters and Minds," the author has included all that he feels must still be said. There is a polemic against the old conception of the self and a number of pages devoted to æsthetic values. It will probably be seen from the above brief description that the book is not a systematic treatise.

Valentine's (9) little book upon experimental psychology is intended for teachers, and the experiments included are those that can be performed with very little material. The book is divided into two parts, one containing a description of the experiments, the other a discussion of results, their value and application. There are only twenty-seven tests, all of which are familiar. They cover association, imagery, attention, learning, mental types, memory, skill, fatigue and general intelligence.

Although Jastrow's book (6) entitled *Character and Temperament* will probably be included in a more special summary of the BULLETIN, yet the scope of the book is so inclusive that it does not seem amiss to describe it here. There is a discussion of the quantitative and qualitative treatment of the subject, an emphasizing of the exactness of an approach by means of statistical data, which data, however, are often difficult of application, and an explanation for his adopting the qualitative method based upon careful analysis. The author then describes the nature of traits especially in their functional aspect. Throughout the book numerous illustrations are drawn from experience as a welcome supplement to formal discussion. It is clear from the outset that one of the author's chief concerns is to show the correct relation and importance of the two factors underlying man's character, "nature and nurture," innate qualities and the results of reaction to the environment with all which that implies. Three things must be remembered in regard to traits; "First, the original trait *persists* in and through its transformation. . . . Second, the primitive direction or trend of the trait is determined by consideration of its uses. . . . Third, in consequence of the evolutionary stages the trait finds a larger and more versatile *order of expression*."

The second chapter deals with the bearing and importance of sensibility. A few types of sensibility such as the hygienic and gastronomic are given detailed consideration. In regard to æsthetic sensibilities the author thinks it plausible that they "owe their being to the sex relation."

A large section is devoted to the influence of emotions upon conduct. "Sensibility supplies the invitation, its acceptance is so involved as to require the ampler influence of the emotional irradiation to carry the stimulus successfully to its satisfying response." The expressions of emotions are genetically considered and the growth of emotions discussed. The emotions rise to a loftier plain through the process of intellectualization. In the chapter upon the "Higher Stages of Psychic Control" two processes are considered operative upon instinctive dispositions, socialization and intellectualization. Shyness, sympathy, suggestion, imitation, etc., are brought in relation to the former, and sentiments such as pride, to the latter.

In the chapter upon "Temperamental Differences" we find temperament "refers to a composite inherent bent of nature" and is practically unalterable. Yet under the influence of the environment it develops into complexes of traits. The discussion leads to the problem of individual differences. In regard to the genius and to men of high capacity the influence of heredity is considered of greatest importance. "The study of individual difference attempts to reduce to measured statement the bases, distribution, and correlations of the differences of endowment."

We come in the next chapter to the abnormal mental tendencies. They are "irregular expressions of normal endowments under exceptional strain." They may always be referred to some functional disturbance of the nervous system. Space is devoted to the neurasthenic temperament, to hysteria and the pathology of fear. In referring to Freud the author believes that in abnormal conditions we may not always find a sexual passion, although there will be present a susceptibility in that direction. There is always the tendency for any temperament to develop into an abnormal complex.

The close relations between normal and abnormal temperaments and between the genius and abnormality are emphasized. "The vagaries of paranoia and flights of genius have a common source as well as a common risk." In describing the "Psychology of Group-Traits" the author takes pains again to insist upon the greater importance of nature as contrasted with outside influences. Those group traits which are the result of inheritance remain the dominant ones. Much attention is given to the subject of sex differences which are studied by following seven clues: bodily, genetic, communal, physiological, psychological, environmental and pathological. Race differences, family traits and the criminal class, are then considered. The next chapter deals with the influences of the environment and the last one with the general topic of "The Qualities of Men."

Bruce's (1) book is written in non-technical language and addressed particularly to parents. The style is that of the popular magazine, in fact a few of the chapters have already appeared in several of them. Many anecdotes and popular accounts of scientific work have been introduced. The key-note of the book is the potent influence of the environment upon the child. Its importance is discussed in the first chapter. Special attention is called to the subconscious factors which have so much influence in shaping the future actions of the individual. The succeeding chapters consider the important factors of the child's environment from its earliest years, including the actions of the parent. In the essay upon suggestion among other things the influence of colors upon the individual is discussed at some length. In the chapter entitled "The Secret of Genius" the author puts forth the belief that, although the man of genius upbuilds and stimulates his subconscious powers by conscious observation and thought, yet any normal individual may attain the title of genius by wise education and adjustment to his surroundings. Accounts of several child prodigies follow. In the chapter upon laziness occasion is taken to describe the medical examinations that are now being made upon children. The cure for laziness is suggestion and medical treatment. In the essay upon laughter the several theories are described. Bruce believes that laughter is a safety valve for excessive energy and for that reason the parents are warned against curbing this instinctive tendency in their children. The latter part of the book deals with hysteria and fear in childhood and here the psycho-analytical method is introduced.

Putnam's (8) book is a semipopularly written little volume for the Mind and Health series. It is educational and ethical in its tendencies with a psychological background. Man's attitude toward the world is influenced by ideals and by inner struggles, cravings and desires. He should know about both these sources of action in order to control them. Ideals are treated by philosophy. Psycho-analysis brings to light the inner motives. A chapter is devoted to a description of the psycho-analytical method and another to its relation to education. Throughout the book there is an insistence upon self assertion in the sense of an unfolding of the best that is within us. To this end parents and teachers should be careful not to use their authority to the degree of crushing independence in the young. Also they should examine their own motives and tendencies in order to qualify as teachers. In the chapter upon "The Rational Basis of Religion" stand is taken against determinism. "The universe is a self-consistent whole, rational and free, ever and eternally changing in detail yet without losing its consistency with itself."

The second part of Whipple's (10) Manual has now appeared, thus completing the revision of the one volume edition. The subject has grown so rapidly since the first edition that many of the tests have had to be considerably altered and much new data from the latest experimental work included. The two new tests introduced are the Kent-Rosanoff test and the Analogies test.

Dumville's (2) "Psychology for Teachers" is a second impression of the little book which was written in 1913 and which in turn is a simpler and more abbreviated form of his "The Fundamentals of Psychology."

Three books have appeared which may be used as supplements to ordinary text-books. Parson's (7) book upon color vision follows closely the plan of treatment adopted by von Kries in Nagel's *Handbuch.* The author is an opthalmic surgeon and is in close touch with Sir William Abney. It is unnecessary to review the contents. All the important phenomena of human color vision are included and in addition a short and very incomplete section upon the results of comparative psychology. The large section devoted to the various color theories will be of special value to students.

Dunlap's (3) "Psychobiology" contains the physiology which a behaviorist should know; that is of the cells, muscular tissue, the nervous system and the glands. Attention should be especially called to a complete and up-to-date neurology, containing numerous cuts, by Herrick (5).

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SPECIAL REVIEWS

American Thought, from Puritanism to Pragmatism. Woodbridge Riley. New York: Holt, 1915. Pp. viii + 373.

Professor Riley's survey of American philosophy is less burdensome reading than the average history of philosophy. This may be because American thinkers are less prone to indulge in unprofitable and perplexing abstractions than their fellow-craftsmen in Greece and Germany. Or it may be that the author's sane appreciation of values has led him to touch lightly on mere verbal jugglery.

The theological interest is the strongest motive in the development of American thought, to judge from this work. Scientific considerations come second, with speculation considerably in the background. The scientific motive is of far less importance in the earlier stages; in more recent years it tends to become paramount. In the philosophy of yesterday and today we find the place of honor accorded to the evolutionism of John Fiske and Mark Baldwin, the psychological idealism of Ladd, the pragmatism of Peirce, Dewey, and James, and the new realism based on science. The St. Louis school of Harris and Royce's idealism are alone in upholding the traditional standards.

This is scarcely the proper place to discuss the theological aspects of American philosophy, which Professor Riley pictures as a contest between Puritanism and various forms of liberalism. Quite apart from their philosophic import, however, these earlier chapters will arouse the psychologist's interest by their vivid portrayal of American national traits. The author has caught our race psychology in a remarkable manner. The average American will feel quite at home among even the austere Calvinists of Puritan times, as he reads Professor Riley's account of these worthies.

The book is in no sense a history of psychology. American contributions to the science are referred to in several places, but rather in an incidental way. The emphasis seems to be not always correctly placed. For example, the speculative writings of Ladd (to whom the book is dedicated) are discussed in great detail, while his *Physiological Psychology* is not even mentioned. Yet one may venture to assert that this one work has influenced the progress of American thought more than the rest of Ladd's works together. The appraisal of Dewey seems fair, and so of Baldwin; but in James again the masterpiece is entirely ignored. On the whole, however, the place of psychology in modern American thought and the contributions of American psychologists to philosophy are properly estimated.

In the earlier period the Scottish faculty psychology and associationism predominated in this country. There appears, according to the author, to have been little original development. Joseph Priestely, a follower of Hartley, settled in this country in 1794, but his chief work here was in chemistry.

The author calls attention to the work of Dr. Benjamin Rush, who has been styled the father of American psychiatry. Rush's attitude toward psychotherapy is significant. He says that aboulia "may be cured in two ways: From the physical side he has been informed by his friend Brissot that animal magnetism will cure like cases; for himself he prefers the psychical remedy, what we would now call mental suggestion" (p. 110). The concept of animal magnetism, as Professor Riley points out, was made popular through the electrical experiments of Benjamin Franklin, another American.

The Philadelphia school of psychiatry which followed Rush emphasized "the reciprocal influences of the physical and psychical. Thus Provost Beasley of the University of Pennsylvania asserted that in every case in which there is performed an operation of the mind, there takes place, at the same time, a correspondent, correlative, and consentient operation of the body. Here was a good alliterative anticipation of the formula of psychophysical parallelism, in which the material side of human nature is given its due" (p. 112).

Among these earlier contributions to psychology, perhaps the most interesting is a description of the child mind by Samuel Johnson of Connecticut and Kings College (not the Londoner!) in a passage of his *Elementa philosophica*, which Dr. Riley quotes at some length. "The first notices of the mind are doubtless those of sense, but directly joined with a consciousness of its perception.

Warmth and hunger, and probably some pains, are, perhaps, all the sensations the infant hath before its birth; and when it comes into the light of this world it is directly impressed with the sense of light and colours, as well as sounds, tastes, odours, and frequent uneasy and painful sensations, all of which still more and more awaken its consciousness . . . upon the repetition every moment of fresh impressions of sense, until by degrees, having a great number of feelings, tastes, odours, sounds, and visible objects, . . . it begins, by means of the intellectual light with which it finds its consciousness attended, gradually to collect and recollect the several relations and connections it observes to obtain among its various ideas. . . . It must . . . be a matter of great exercise of thought in an infant mind to learn . . . the notion of the various distances and situations of things tangible, by its observations on the various degrees of strength and weakness, of vividness or faintness of the light reflected from them, in the things visible constantly connected with them. And at the same time . . . it is also learning the names of things and the connection and use of words . . . . And, as if all these were not task enough, it hath all this while to be learning how to use its limbs, its hand in handling, its tongue, and other organs of speech, in making and imitating sounds, and its whole body in all its exertions and particularly, at length, the poise of its center of gravity and the use of its feet in walking" (pp. 24–25). Written in 1753, this is a very creditable attempt at genetic psychology.

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Manual of Mental and Physical Tests. G. M. Whipple. 2nd Ed. Part I. Baltimore: 1914, Warwick and York. Pp. xvi + 365.

The additions in this first volume of the new edition amount to approximately 80 pages. Nearly all the changes which have been made are in the nature of either addition of new material or alterations or amplification in form of statement. The most important additions consist of (1) new paragraphs in the introductory chapters on General Rules for the Conduct of Tests and The Treatment of Measures; (2) the addition of Tests 25a and 25b on the spot pattern and the form board; and (3) the addition of references at the end of the individual tests. In some cases the addition of references is considerable, amounting in one case to twenty-five.

In the chapter on General Rules for the Conduct of Tests there is a recognition of the fact that a uniformity in the conditions of a test is not to be interpreted in a mechanical fashion. Latitude in external details may be permitted in order that the essential similarity in the mental condition or attitude of the subject may be maintained. The rules are further amplified by discussion of the significance of the score in terms of speed of performance. The relative reliability of oral and written responses of subjects of different ages is discussed. The necessity of getting a measure of the reliability of a test by giving it more than once to the same individuals is justly emphasized. Finally, the well established fact that more than one test is necessary to establish the status of an individual is brought out.

In the third chapter on the treatment of measures there is an addition of several new formulae. Means are given of calculating the variability of measures of central tendency and of differences between means. Several new methods of determining correlation are included, as the relationship of contingency and the calculation of pooled results. Two corrections in minor details of formulae were noted.

In the sections devoted to the individual tests the chief changes, beside the introduction of two new tests, consist in the amplification and systematization of the treatment of results. In one or two cases there is a change in the apparatus.

The book shows evidence of careful revision throughout but there has been no alteration in its general character and purpose. It continues to be chiefly a reference work which has for its purpose the indication of standard procedure in the conduct of tests, and the presentation of a critical summary of the results of these tests. Even a slight acquaintance with the literature on tests is sufficient to make it evident that the standardization of procedure is very important. While actual experience in psychological experimentation is necessary to enable one to apply test methods properly, some agreement as to procedure is necessary even among skilled experimenters. Such a standard of procedure should not restrict investigation by varied methods, but it is useful to have a standard of procedure which can be followed for the purpose of getting comparable data. Whipple's book is a very careful formulation of such a standard in the tests which have been selected for his manual. It is safe to say that whenever one wishes to adopt a standard procedure in any of these tests it would be well to follow Whipple's procedure unless there is positive reason for deviating from it.

It is worthy of comment that the general character of the tests remains the same, in that they are designed as measures of individual mental functions in the main, rather than as measures of the efficiency in the performance of a complex task, the unity of which is determined by its aim. In the present arrangement some assumption must be made regarding the particular mental function which is measured in a certain kind of performance. In the other type of test measurement of performance is undertaken because efficiency in it has some practical value. Such tests are being rapidly developed as a means of measuring the efficiency of pupils in their performance in the various subjects of the curriculum. It may be that the difficulty of classification and organized treatment of the results would make the inclusion of the large body of data from these tests unwise in such a work as this. The line is not always sharply drawn, however. Thus there are included tests of adding and of reading, and it would seem that a fuller treatment of these and the inclusion of several which have been most thoroughly standardized would add considerably to the practical value of the book. In the work of testing in the school subjects several issues have emerged which make it desirable that the principles underlying them be discussed. The author, however, has put the psychological and educational world under large debt by his careful and extensive collation of the data which are at hand upon the tests which he has chosen to include.

Frank N. Freeman

University of Chicago

BOOKS RECEIVED

CHILD, C. M. *Individuality in Organisms.* Chicago: Univ. of Chicago Press, 1915. Pp. x+213. $1.25 net.

WOODS, J. H. *The Yoga-System of Patanjali.* Cambridge: Harvard Univ. Press, 1914. Pp. xli+385.

LANGLEY, S. G. *Philogeny.* San Francisco: Shannon-Conmy Printing Co., 1915. Pp. 20.

AFTER, E. V. *Einfuhrung in die Psychologie.* Leipzig: B. G. Teubner, 1915. Pp. 119.

HUBBERT, H. B. *The Effect of Age on Habit Formation in the Albino Rat.* Boston: Holt, 1915. Pp. iv+55. 65 cents. (Behavior Monograph No. 11.)

PEARL, R. *Modes of Research in Genetics.* New York: Macmillan, 1915. Pp. vii+182. $1.25.

TITCHENER, E. B. *A Beginner's Psychology.* New York: Macmillan, 1915. Pp. xvi+362. $1.

The American College. (Introd. by W. H. Crawford.) New York: Holt, 1915. Pp. xi+194. $1.25.

GUYER, M. F. *Being Well born. An Introduction to Eugenics.* Indianapolis: Bobbs-Merrill, 1916. Pp. xviii+374. $1.

NOTES AND NEWS

At its meeting in Chicago the American Psychological Association elected the following officers: president, Professor Raymond Dodge (Wesleyan); members of the Council, Professors Carr (Chicago) and Dunlap (Johns Hopkins). Professor R. M. Ogden continues as secretary-treasurer. It was decided to hold the next annual meeting in New York City in affiliation with the A. A. A. S.

The Southern Society for Philosophy and Psychology at its meeting in Columbus elected the following officers: president, Professor D. S. Hill (Tulane); vice-president, Professor E. K. Strong, Jr. (George Peabody); members of the Council, (two years) Professor P. Wardlaw (South Carolina), (three years) Professors J. C. Barnes (Maryville) and E. E. Rall (Tennessee).

The following officers were elected at the recent meeting of the American Philosophical Association: president, Professor A. O. Lovejoy (Johns Hopkins); vice-president, Professor E. A. Singer, Jr. (Pennsylvania); secretary, Professor E. G. Spaulding (Princeton); members of Council, Professors Rogers, Pratt, Cohen, and Urban.

Professor F. M. Urban, of the University of Pennsylvania, after having served at the front with the Austrian army and later in the hospital corps, is now in Sweden, but will probably not be able to return to this country on account of the taking off of ships and the detention of citizens of the Central powers by the Allies. Professor Urban's address is Grand Hotel Haglund, Göteborg, Sweden.

During December six lectures were given at the Boston Psychiatric Hospital and one at Wellesley College by Dr. Shepherd Ivory Franz, on the functions of the cerebrum.

Announcement has been made of the temporary suspension of the Italian journal *Psiche* on account of the war.

Vol. XIII. No. 2. February 15, 1916

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THE
PSYCHOLOGICAL BULLETIN

PROCEEDINGS OF THE TWENTY-FOURTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION, CHICAGO, ILLINOIS, DECEMBER 28, 29, 30, 1915.

REPORT OF THE SECRETARY, R. M. OGDEN, UNIVERSITY OF KANSAS.

The American Psychological Association held its twenty-fourth annual meeting at the University of Chicago on Tuesday, Wednesday, and Thursday, December 28, 29, and 30, 1915. The general program was conducted in rooms of the Law Building, conveniently situated and well adapted to the needs of the occasion.

The sessions were well attended. One hundred and two names were registered, while it was estimated that one hundred and fifty to two hundred participated at times in the various meetings. The program embraced some seventy titles, a much larger number than ever before. Among the titles listed, those bearing upon various phases of mental tests were most largely represented. Of these there were twenty-two. Next in order of topics came experimental psychology with thirteen titles, then eight each on animal and educational psychology, seven on general psychology and two each on social and abnormal psychology. The remaining titles embraced the discussion on the relation of psychology to science, philosophy and pedagogy, and also included several papers related to the laboratory. Only four whose names appeared on the program were unable to be present.

A special feature of the program was the session of Wednesday forenoon, December 29, which was devoted to a discussion on the Relation of Psychology to Science, Philosophy and Pedagogy in the Academic Curriculum. Pursuant upon a resolution adopted at the last annual meeting, the Committee on the Academic Status of Psychology proposed this topic and nominated the leading speakers.

Mr. Dodge, who was to speak on the relation of psychology and science, was unfortunately detained at home by illness. The remainder of the program was carried out as scheduled: the relation of psychology and science being presented by Mr. M. F. Meyer; the relation of psychology and philosophy by Messrs. Gardiner and Ogden, and the relation of psychology and pedagogy by Messrs. Judd and Haggerty. In the informal discussion which followed, the chief topic of interest was the latter relationship, and led to an interesting debate upon the significance of psychology as a fundamental study in the training of teachers. At the close of this session opportunity was afforded Mr. Dunlap to present the results of a questionary concerning psychological terminology. A resolution bearing upon this was introduced at the business meeting, as will be mentioned below.

The apparatus exhibit, which was placed in a room adjacent to those used for the regular meetings, aroused much interest. In addition to a large collection of standard apparatus and teaching materials offered by the C. H. Stoelting Company of Chicago, the following among the many pieces of new apparatus exhibited and demonstrated by members of the Association may be mentioned: A collection of instruments and charts, by Madison Bentley of the University of Illinois; the Johns Hopkins Chronoscope by Knight Dunlap of the Hopkins; the exposure apparatus of C. L. Hull, University of Wisconsin, offered by Joseph Jastrow; the constructive ability test of T. L. Kelley, University of Texas, offered by the secretary; a recorder for tapping, and a portable tachistoscope and memory apparatus by H. L. Langfeld, Harvard University; the peg form boards of J. E. W. Wallin of St. Louis.

The annual dinner of the Association was held at the Quadrangle Club, Wednesday evening, December 29. Ninety-two covers were laid. Following the dinner, President Watson read his address entitled: "The Place of the Conditioned-Reflex in Psychology." A general smoker and informal social gathering then engaged the participants until a late hour.

Thanks to the efforts of Mr. Carr, the local member of the Executive Committee, and the cordial coöperation of members from the departments of psychology, education and philosophy, the appointments for the various events of the meeting were admirable, and those in attendance were heartily welcomed and their needs fully provided for.

Upon the invitation of Dr. William Healy, of the Cook County

Juvenile Court, about forty members of the Association visited the Court's Detention Home on Friday morning, December 31. An informal discussion of the work with juvenile delinquents was engaged in, followed by a delightful luncheon served at Hull House, in which Miss Jane Addams participated. In the afternoon the members of the party were permitted to sit with Judge Merritt W. Pinckney at a very interesting session of the Juvenile Court. The occasion proved highly enjoyable and profitable to those who attended, and an informal vote of thanks was extended Dr. Healy and his associates for this considerate hospitality.

Record should also be here made of the joint session arranged in coöperation with the officers of the Association by Section VIII (sub-section, "Sociological Medicine") of the Pan-American Scientific Congress. This session was held at the Raleigh Hotel, Washington, D. C., Monday, January 3. Appearing on the program were names of the following members of the Association: G. Stanley Hall, William Healy, H. H. Goddard, E. E. Southard and Lightner Witmer.

TRANSACTIONS AT THE ANNUAL BUSINESS MEETING

The annual business meeting of the Association was held at 3:30 p.m., December 29. Some sixty members were in attendance. The reading of the minutes of the previous meeting being dispensed with, the President called for reports from the standing committees of the Association. The first to report was the chairman of the committee on the standardization of mental measurements and tests, Mr. Yerkes. The committee has been reorganized during the past year, and the following work is either in progress or definitely arranged for: (1) Woodworth and Wells propose to revise their work on association; (2) Pillsbury proposes to continue the study of means of measuring the intensity of liminal sound; (3) Baird and his associates will study methods of training in the use of introspection; (4) Yerkes and his associates will attempt to perfect methods for studying comparatively ideational types of behavior. As a sub-committee, Watson and Lashley will work on the applications of the reflex method in human psychology. The report was accepted and placed on file.

The chairman of the committee on teaching experiments, Mr. Bingham, offered no report. The chairman of the committee on psychology and medical education, Mr. Franz, recommended that this committee be discharged, since the work it was expected to do has been accomplished. A motion to this effect was carried. In the absence of any other member of the committee on prizes, the president, a member *ex officio*, made the alternative suggestions of reorganization or the discharge of the committee. It was moved and carried that the committee be discharged.

Owing to the absence of Mr. Warren, chairman of the committee on the academic status of psychology, Mr. Judd made some informal remarks from data furnished him by the chairman, and offered for distribution, in printed form, the committee's report of this year on the academic status of psychology in the normal schools. This report, a very thorough study of the situation, was prepared largely through the coöperative efforts of Miss M. F. Washburn and Mr. B. T. Baldwin. It is the chairman's intention to distribute copies to each member of the Association. The resignation of Mr. Warren from the committee was tendered and reluctantly accepted. It was voted to continue the committee with the special instruction that it coöperate with the committee of fifteen of the Association of University Professors in matters concerning academic freedom and academic tenure. The Council was furthermore empowered to reconstitute the membership of the committee as might be found necessary. In the absence of any member of the committee in charge of the San Francisco meeting of the Association, which took place at the University of California, August 3 and 5, and at Stanford University, August 4, Mr. Yerkes, who had been in attendance, volunteered a few remarks. The proceedings of these meetings have already been published in the PSYCHOLOGICAL BULLETIN (12, 313–332).

The committee on nominations was next called upon for its report. Mr. Woodworth, chairman, responded. It will be remembered that at the twenty-first annual meeting in Cleveland, a resolution was adopted suspending the provisions of the constitution as regards the election of officers for a period of three years. During this time a nominations committee was provided to canvass the membership and prepare a ticket for president and the vacancies upon the Council which should be presented for ballot at the annual meeting. It was also provided that a committee should report at the expiration of this term upon the working of the plan, and propose a constitutional amendment, if such were deemed desirable, to fix the mode of procedure at future elections. The present committee on nominations having been entrusted with this additional task, introduced their proposals in the following resolutions:

1. *Resolved,* That Article II of the Constitution be amended by striking out the words, "shall nominate officers for the Association."

2. *Resolved,* That Article III be amended to read as follows:

ARTICLE III

Officers

"*Section 1.* The secretary of the Association, who shall also be its treasurer, shall be nominated by the Council and elected by the Association at an annual meeting, and shall serve for a term of three years.

"*Section 2.* The president and two members of the Council shall be elected annually by the Association, a nominating ballot and an election ballot being successively cast by mail under the supervision of an election committee. Election shall be by plurality in the election ballot, or, in case of a tie, by a majority vote of the annual meeting.

"*Section 3.* In case of the death, disability or resignation of any of these officers, the Council shall appoint a successor to serve until the next annual meeting of the Association. Vacancies existing at the time of an annual meeting shall be filled by vote of the meeting."

3. *Resolved,* That the following By-law be adopted regulating the procedure of elections:

"The election committee shall consist, except as an annual meeting may otherwise direct, of the retiring president, chairman, and the two other members of the Association who shall have most recently held the office of president. At least two months before the date set for the annual meeting, this committee shall issue a call for the nominating ballot, which ballot it shall count forty days before the annual meeting, and shall thereupon report to all the members the names receiving a large number of votes, including at least two candidates for president and at least four candidates for the office of member of the Council; and at the same time it shall call for the second or election ballot, which it shall count fifteen days before the annual meeting, and report the election at the meeting."

4. *Resolved,* That the plan embodied in the above proposed amendments shall be in force for the coming year, the provisions of the Constitution regarding the election of officers being suspended for that period.

The report was received by the Association, and later adopted as read. The constitutional amendment included is therefore before the Association for final disposition at the next annual meeting.

This committee also reported upon their recent canvass for nominations. The following ticket was placed in nomination: for President, Mr. Raymond Dodge, of Wesleyan University; for one member of the Council, Mr. H. A. Carr. As a second member of the Council, the names of Messrs. Dunlap and Hollingworth were proposed. The secretary was instructed to cast the ballot of the Association for the election of Messrs. Dodge and Carr. Ballots were then taken upon the nominations of Messrs. Dunlap and Hollingworth, the result indicating the election of Mr. Dunlap.

The following items of business reported by the Council were then acted upon:

I. The invitation of Mr. Woodworth, on behalf of the department of psychology of Columbia University, to hold the twenty-fifth annual meeting of the Association in New York City was accepted, subject to revision by the Council if necessary. It was understood that the meeting would occur during "Convocation Week" in affiliation with the American Association for the Advancement of Science.

II. The nomination of Mr. Woodworth as representative of the Association on the Council of the American Association for the Advancement of Science was ratified, and the selection of Mr. H. L. Hollingworth as local member of the Executive Committee was announced.

III. It was moved and carried that this year's practice of printing the abstracts, so far as possible, in advance of the meeting, in order that they may be available for distribution among the members present, should be continued.

IV. To avoid in future congestion of the program, due to an over-supply of titles, it was recommended that the Council be authorized to appoint three members annually to serve as a program committee; this committee being empowered to select from among the titles submitted those papers to be read, and those to be listed by title only, due consideration being given to the number of papers offered, the character of those desired to constitute an evenly balanced program, and the restriction, if necessary, of papers by non-members and more than one paper by one person. The recommendation was adopted, and the Council reported the membership of the program committee of 1916 to consist of Messrs. Bentley, Whipple and the secretary.

V. The Council recommended that the secretary be instructed to secure from members additional information concerning the following: (1) their degrees, together with the names of institutions by which the degrees were conferred; (2) the institutions they are serving, including their official titles; (3) their subjects of instruction (*e. g.*, psychology, philosophy, education, etc.); (4) their subjects of research (*e. g.*, general psychology, experimental psychology, educational psychology, animal psychology, tests, etc.). The information is to be filed, and when collected in sufficient amount will be incorporated in the Year Book. The recommendation was adopted.

VI. The treasurer's report was read, as printed below, and accepted. The following appropriations were recommended by the Council and approved by the Association: In connection with the 1915 meeting, amounts not to exceed $25 for the smoker and incidental expenses, $25 for the apparatus exhibit and $20 for the printing of abstracts; In connection with the 1916 meeting, amounts not to exceed $25 for the smoker and incidental expenses, $25 for the apparatus exhibit, $25 for the committee on nominations, and $20 for the printing of abstracts. The treasurer reported a budget of approximately $525 for the year 1916, and a probable deficit of $200. It was voted that the Council be empowered to withdraw $200 from the principal funds of the Association to meet such a contingency. The principal funds of the Association, now invested in the Union Dime Savings Institution, are $2,646.74; this amount having been designated as such by action of the Association taken at the sixteenth annual meeting, 1907. The Council was empowered last year to withdraw $100 from the principal, but was not constrained to do so. The amount of $100 which was withdrawn, was afforded by accumulated interest.

VII. Upon recommendation of the Council, the following persons were elected to membership in the Association: M. L. Ashley, Ph.D., head of the department of psychology, Chicago Teachers College; G. C. Basset, Ph.D., professor of educational psychology, University of Pittsburgh; Augusta F. Bronner, Ph.D., assistant director, Juvenile Psychopathic Institute, Chicago; A. A. Cleveland, Ph.D., professor of psychology, State College of Washington (Pullman); H. W. Crane, Ph.D., instructor of psychology, Ohio State University; J. E. De Camp, Ph.D., instructor of psychology, University of California; F. D. Dockeray, Ph.D., assistant professor of psychology, University of Kansas; A. S. Edwards, Ph.D., instructor of psychology, University of Minnesota; Ellsworth Faris, Ph.D., associate professor of psychology, Iowa State University; G. A. Feingold, Ph.D., research fellow, Clark University; G. V. Hamilton, M.D., physician and psychiatrist, Santa Barbara, California; Helen B. Hubbert, Ph.D., Johns Hopkins University; T. L. Kelley, Ph.D., adjunct professor of educational psychology, University of Texas; Gertrude Rand, Ph.D., associate in experimental and educational psychology, Bryn Mawr College; Clara Schmitt, Ph.D., assistant, department of child study, Chicago Public Schools; L. T. Troland, Ph.D., Sheldon traveling fellow in psychology (Harvard), Nela Research Laboratory, Cleveland, Ohio; J. L.

Ulrich, Ph.D., instructor of psychology, Catholic University of America; Elizabeth L. Woods, Ph.D., instructor of psychology, Vassar College; A. P. Weiss, M.A., assistant professor of psychology, Ohio State University.

VIII. The secretary reported the resignation of one member, and the death, on October 20, of Dr. William Noyes, formerly superintendent of the Boston State Hospital for the Insane.

Under the head of new business the following items were disposed of:

I. Mr. Judd raised a question as to the Council's interpretation of a statement regarding requirements of candidates for admission to membership in the Association, and moved that it be the sense of the Association that the statement appended to Article I of the Constitution defining "temporary positions" should not be interpreted to include under this head the position of instructor. The motion was seconded and carried. In view of this action it was also moved by Mr. Judd that the Council be authorized, in case it saw fit, to bring additional nominations to membership before the Association at the next morning session. This motion was lost.

II. The resolutions introduced by the Committee on Nominations, and including the proposed constitutional amendments, as previously set forth, were then brought forward and adopted.

III. The following resolution was introduced by Mr. Jastrow:

> "The past-presidents of the Association in attendance at Chicago request that the Council be instructed to provide for the next meeting a suitable recognition of the occasion as the twenty-fifth annual meeting of the Association."

The resolution was adopted, and the Council later appointed the following committee to make the necessary arrangements for such a commemorative program: R. S. Woodworth, chairman, R. P. Angier, H. C. Warren and the president (Mr. Dodge) *ex officio*.

IV. It was moved by Mr. Franz that a vote of thanks be extended to the University of Chicago, the members of the departments of psychology and education and the management of the Quadrangle Club for the entertainment accorded the members of the Association during the present meeting. The motion was seconded and unanimously carried.

V. Mr. Dunlap introduced a resolution providing that the president of the Association appoint a committee of five to consider the matter of uniformity in the usage of psychological terms; this committee to confer with a similar committee of the American

Philosophical Association, if such be appointed, and report at the next annual meeting. It was furthermore provided that the chairmanship of this committee should be assigned to Mr. H. C. Warren, if he will accept. The resolution was carried.

VI. Mr. Whipple introduced the following resolution which, after discussion, prevailed:

> "Whereas, Psychological diagnosis requires thorough technical training in all phases of mental testing, thorough acquaintance with the facts of mental development and with the various degrees of mental retardation;
>
> "And whereas, There is evident a tendency to appoint for this work persons whose training in clinical psychology and acquaintance with genetic and educational psychology are inadequate:
>
> "*Be it resolved*, That this Association discourages the use of mental tests for practical psychological diagnosis by individuals psychologically unqualified for this work."

VII. Mr. Waugh moved that the collection of data from those who have been administering mental tests be referred to a committee in order that a beginning may be made toward the establishment of norms. The motion was seconded, and an amendment offered referring the matter to the standing committee on mental measurements and tests. The motion as amended was then passed.

VIII. At a subsequent meeting of the Association the following resolution was offered by Mr. Carr.

> "*Resolved*, That the retiring president be empowered to appoint a committee to express the approval of the Association in the establishment of a station for the study of the behavior of primates."

The resolution prevailed, and the president later announced the appointment of the following committee: J. R. Angell, chairman, Raymond Dodge, Stanley Hall, G. M. Stratton and E. L. Thorndike.

Report of the Treasurer for the Year 1915.

Dr.

To Balance from the previous year	$2,750.24	
Dues received from members	305.75	
Interest from July 1, 1914 to July 1, 1915	94.13	
Sale of monographs No. 51 and No. 53, year ending December 31, 1914	27.92	
Balance returned by retiring Chairman, Committee on Teaching Experiments	5.00	$3,183.04

Cr.

By Printing and supplies	99.00	
Postage	25.00	
Telegrams	1.73	
Express	3.63	
Reprints of Proceedings	12.47	
Reprints of President's Address	14.38	
Incidental expenses, 1914 meeting	33.68	
Expenses, Committee on Nominations, 1915	11.29	
Secretary's stipend	250.00	
Exchange on checks	.70	
Dues, undeposited	2.00	$ 453.88
Balance in Fifth Avenue Bank	$ 68.58	
Balance in Union Dime Savings Institution	2,660.58	$2,729.16
		$3,183.04

R. M. Ogden,
Treasurer
Audited by the Council

Lawrence, Kansas,
December 24, 1915

TITLES AND ABSTRACTS OF PAPERS

GENERAL PSYCHOLOGY

The Place of the Conditioned-Reflex in Psychology. (Presidential Address.) J. B. WATSON, Johns Hopkins University.

The Relation of Psychology to Science, Philosophy, and Pedagogy in the Academic Curriculum. Special Discussion.

Psychology and Science. R. DODGE, Wesleyan University.

Speaking exclusively from the standpoint of the undergraduate college with limited means, I aim to state the problem as it is faced by a majority of the members of this Association. Three fundamental factors operate to determine academic relationships: similarity of subject matter or method, administrative economy, and educational expediency. In a growing science the first factor will change more or less with every important phase of its development. Academic relations that are determined solely on this basis will vary with the development of the science as a whole, or with the particular aspect of the science that is emphasized in any particular institution. Our actual relationships on this basis are manifold. But no one can predict the future. The main requirement is that no relationship should be over-emphasized to prevent the free development of our own systematic problems. If the first factor were the only one the ideal situation would be independence of all close affiliations.

Unfortunately administrative exigencies are often insistent and usually beyond our control. If it is a question of uniting psychology with philosophy or with physiology, I believe the former combination the better. Independence is the only satisfactory condition. The development of a laboratory demands administration like that of the other laboratory sciences. But except for occasional emergencies, psychology cannot properly combine with any other science either in its laboratory or its apparatus. In the small college combination courses are also inexpedient. Special discussion of relevant facts from other sciences should be provided by the psychologist. For the same reasons the use of psychological material by other sciences should not be permitted to interfere with our systematic courses.

With respect to educational expediency, whatever the future may bring, psychology belongs with the humanities rather than with the special sciences of things. Its usefulness is greatest in this group. Moreover the greatest danger to students of psychology will not be ignorance of chemistry, physics or physiology; but their natural if not inevitable speculative evaluation of psychological facts. I know of no other science where a knowledge of the logic of science is more necessary, or where speculative caution is more vital.

With varying emphasis on the different factors, our academic affiliations cannot be uniform. The essential principle that we should collectively insist on is the freedom of psychology to give its own systematic courses, and to develop its own problems irrespective of all extrinsic demands.

Psychology and Science. M. F. Meyer, University of Missouri.

The Relation of Psychology to Philosophy. H. N. Gardiner, Smith College.

The prevailing relation is due to historical conditions and considerations more or less accidental; in modern times, as well as in ancient, psychology has been largely cultivated and developed by men who were also philosophers. Moreover, the intrinsic relations of psychology and philosophy are, in fact, many and intimate. But there is now a general consensus on both sides that psychology is essentially an empirical science. Admitting this, the logical conclusion is that it should be established in at least our universities and larger colleges as an independent department. Against this no valid objection can be urged on theoretical ground; not the relatively undeveloped state of the science, for it is surely sufficiently advanced in data, purpose and method for its share of the freedom enjoyed by other sciences; nor the supposed uniquely intimate relations of psychology and philosophy, for this uniqueness may reasonably be denied, each having in its own way the most intimate relations with every field of learning and experience. On the other hand, certain advantages would accrue to both disciplines from the separation, as, *e. g.*, in the removal of causes of friction which sometimes now arise within the common department, in the added prestige to psychology without corresponding loss to philosophy, and in taking from philosophy itself one source of its besetting temptation to subjectivism and leaving it free to develop impartially its relations to all disciplines. A separate department of psychology should not be one-sided, but should concern itself with the natural history and scientific explanation of mental phenomena wherever and however manifested in all their relations. This is a sufficiently vast field for a department and we may reasonably expect that such a department will be established in our larger universities as soon as the extent and importance of the field is recognized. Apart from this ideal relation, much may be done to render tolerable and even mutually advantageous the present situation by not exaggerating difficulties, by democratic administration and by tolerant adjustment of interests. It is desirable that the teacher of philosophy should be trained in psychology and that the teacher of psychology, as of every other subject, should have some acquaintance with the problems of philosophy. In a curriculum where neither subject is required, equal opportunity should be given to both; if either is required it is perhaps preferable that in an elementary form both should be. But neither should be treated as merely propædeutic to the other.

Psychology and Philosophy. R. M. Ogden, University of Kansas.

Psychology is no longer a normal prerequisite to the study of philosophy. The present generation of teachers of psychology are, many of them, untrained in philosophy. They see among the issues of their science applications to commercial affairs, educational procedure, medicine, including the testing of mental deficiency, but seldom the peculiar bearings of psychology upon a theory of life.

The teacher of philosophy levies a very special tribute upon psychology: a tribute which must be paid in coin of the philosophic realm in order that his students may comprehend fully some of philosophy's chief problems. Among these, idealism, based as it is upon a subjective point of view, ranks first. Only through the exercise of introspection, or *psychologizing*—an evaluation of experience as distinct from its conditions resident in physical stimulus and physiological process—does the average student learn to grasp the significance of an *inner* as distinct from an *outer* world.

Instruction in psychology, when it emphasizes the field of consciousness, defining conscious contents and mental activities, lays a natural foundation upon which the teacher of philosophy may build. Spiritualism, as contrasted with materialism; realism, idealism, positivism; all gain their peculiar meaning with reference to a comprehension of experience *qua* experience. The problems of value, teleology and the like, also find a firmer footing in minds which can distinguish psychological data from the data afforded by the natural sciences.

In the hands of instructors unsympathetic towards, or unenlightened with regard to philosophic problems, this foundation is not given. The objective view of psychology in particular, with its behavioristic leanings, is no better suited to induct the student into the problems of philosophy than is the study of any other science.

Since the demands of philosophy are insistent in the direction noted, it becomes necessary that the teacher of philosophy shall supply his students with the psychology which they have failed to secure before coming to him. If the demand is not realized and fulfilled by those responsible for the courses listed under psychology, we may expect psychological courses, otherwise named perhaps, conducted again by teachers of philosophy who may be ill-equipped to present the subject in its appropriate and well established outlines as a science of mind.

The Relation of Psychology to Pedagogy. C. H. Judd, University of Chicago.

Since the days of Herbart, psychology has been recognized as one of the fundamental sciences on which educational studies must be based. In many institutions the course of training for teachers has been so organized that psychology has been required as introductory to all the other phases of the science of education. Skepticism regarding the value of psychology has arisen in the course of experience on three grounds. First, general psychology is so far removed in its broad statements from the concrete and detailed problems of teaching that the connection has often been hard to trace between psychology as actually taught and the practical needs of the teacher. Second, the immature student has very commonly been given the fundamental science of psychology because of its logical relations to educational theory at a period in his training when he knew nothing of the educational problems themselves. The student has therefore been quite unprepared to use his psychology and has lost most of it before educational applications became possible. Third, the disputes within psychology itself have very largely reduced the value of this science for teachers.

The conclusion of our considerations is that psychology in its present form cannot be used as an introductory course for teachers.

The science of education must be developed by a direct attack upon educational problems. The productive methods of psychological study and experimentation will be carried over by the trained leaders in educational science, but the rank and file of teachers will profit more by experimental education than by the study of general psychology. The fundamental value of psychology will appear in the training which it gives to advanced students of education, especially those advanced students who are going on to research.

Possibly it will be well to use the term "educational psychology" for certain intermediate courses which are implied in these suggestions. Perhaps the term "experimental education" is better.

As a matter of practical organization, courses in psychology for teachers can be given with profit either by students of education who have trained themselves in scientific methods, or by students of science who have become aware of the character of school problems. No one who is not aware of the character of school problems should mix in educational psychology or experimental education.

The Relation of Psychology and Pedagogy. M. E. HAGGERTY, University of Minnesota.

This discussion will concern itself with the general plan of courses in psychology leading to advanced work in education. In the service of concreteness, an actual rather than a theoretical program will be presented.

The essentials of this program are as follows: (1) Elementary psychology, one semester; (2) experimental psychology, one year; (3) advanced educational psychology, one year; (4) collateral courses in animal behavior, abnormal psychology, social psychology and psychology of religion, one semester each. All courses are electives.

(1) The elementary course follows the lines indicated by such books as James, Angell, Judd, and Pillsbury, consideration being given to the nervous system and its functions. (2) The experimental course covers sensation, especially vision, imagery, memory, learning, attention, reaction, space perception, mental tests, and leads in some cases to a bit of minor research near the end of the year. This course is taken by students who are not looking forward to education, but it also gives opportunity for a student of education to find himself, to try out his interests and develop the technique of experimentation. It also grounds the student more or

less thoroughly in the fundamental facts of psychology. (3) The year of work in advanced educational psychology requires elementary psychology as a prerequisite. The laboratory course is also recommended. It is a lecture, reading, and recitation course covering the range of topics represented by Thorndike's three volumes. The first part is a course in mental development leading to a study of learning processes. This course demands an acquaintance with the literature on instinct, heredity, experimental studies in learning, etc. The latter part of the year's work concerns itself with the literature on individual, sex and race differences. (4) Students are urged to supplement the foregoing courses with work in abnormal, animal, and social psychology, work in the history of philosophy, ethics, etc.

In all this work, the behavioristic point of view is emphasized on the assumption that educationists are interested in human beings as behaving organisms whose behavior is modifiable, and that the behavior in question involves much more than is included in the term consciousness.

The Present Status of the Methods of Teaching Psychology in the Normal Schools of the United States. B. T. Baldwin, Swarthmore College. (A report prepared in collaboration with the Committee on the Academic Status of Psychology.)

At the present time (December first) replies to twelve questions supplemented by reports and outlines, have been received from 120 instructors (100 men and 20 women) in psychology in 116 state and four private normal schools. The median of the average number of hours devoted to psychology in these institutions is 115, with a range of distribution from 40 to 520. In most instances the work is given in the first or second school year, and varies in scope in different fields of training. The predominant fields comprise work in general, educational and child psychology, with occasional courses in animal and experimental psychology, and the psychology of special branches of learning. Most of the fifty-four texts used are modern and with few exceptions the recitation method is followed in class procedure. The average sizes of the classes range from 10 to 80 with a median of 45; the number of classes per instructor per day ranges from 1 to 6 with a median of 3.5.

There is a marked tendency to correlate more closely the psychology with the practice teaching through applications to methods of teaching, observation of children, and occasional experiments and measurements, though with little reference to measuring scales in different school subjects. Of the 120 instructors 27 report the use of laboratory equipment ranging in value from $15 to $2,000, which is used for experiments in general psychology, demonstration, "standard tests," sensory and motor tests, experiments in learning, clinical work and educational tests. In 57 schools students observe and give mental tests, while in 18 observation alone is given.

In the main the work in psychology aims to direct education by laying foundations in psychological principles which acquaint the students with important conscious processes of growing children; to lead to a study of individual differences and to search for the principles involved in the learning processes; to familiarize students with behavior as an expression of consciousness, and to teach students to psychologize.

Among the significant problems evoked by the study are: Is psychology a necessary prerequisite for educational psychology? How far should mental tests take the place of experimental psychology? How may instructors introduce into their work the elements of experiment and elementary research?

The Present Status of Psychology. C. A. Ruckmich, University of Illinois.

Many claim that psychology as a distinct science is now in a very critical period. Philosophers, physiologists, and psychologists unite in denying it in its fundamental principles. On the other hand, the science is receiving greater academic recognition every year in many universities of this country and Europe. But a better index of its present condition is obtainable on the basis of an estimate of its literary productivity. A study of the periodicals published in this country during the past decade was therefore undertaken. To avoid complications with the abnormal conditions of European publications, no foreign periodicals were consulted. Both the quantitative and qualitative aspects of the problem were considered. The statistical results show quantitatively a steady and, for this year, an unusual relative increase in the number of separate investigations published; qualitatively we find more and more stress on introspective analysis. To emphasize this aspect of the situation, the four-fold subdivision of psychological methods which was proposed several years ago has been followed through with a good showing for the method of introspection. A large percentage of the results of the year has been obtained by this method. While a number of critics are attacking the foundations of the science, the experimental work is proceeding apace. After all, the older and better established sciences like physics and chemistry are now suffering the same fate.

The Definition of Sensation. C. Rahn, University of Illinois.

The modern sensation as the psychical correlate of the process of stimulation of organs of sense may be traced from Plato's *αἰσθητόν*, through Locke's "impressions" and Kant's phenomena, to the fixing of the conception in the earlier experimental investigations of Weber and Fechner. It is the sensation that crystallizes in the later Wundtian psychology: the sensation that is the correlate of the objective stimulus, as over against feeling, which always has a "subjective" reference. Contemporary development has been in two directions: (1) under the influence of an emphasis upon the dependence of consciousness upon "apperceptive" or "central" factors; and (2) under the influence of a conception of dependence of consciousness upon "conative" or "efferent" factors. Under (1) we find two modes of procedure. There is either (*a*) hypostatization of the modifications of consciousness depending upon the apperceptive or the central factor, as "thought element" (Buehler, Woodworth, Ogden), or (*b*) a reference to certain of these modifications as modifications of "sensory" consciousness (Kuelpe, Watt). Under (2) we find parallel tendencies: (*a*) there is an abstraction from sensory consciousness as dependent upon stimulus, though what is abstracted as non-sensory is not "thought" but a "conation" (Stout), or an "attitude" (Binet), or certain feelings curiously reminiscent of the old-time "feelings of innervation" (Wundt); or else (*b*) this aspect of consciousness, while noted, is not abstracted as an "element" and placed over against sensation, but is conceived as an integral part of it (Dewey). Whatever the warrant for these differences in systematic procedure, they all represent attempts on the part of a descriptive psychology to do justice to those aspects of consciousness that are not solely or immediately dependent upon modifications in the stimulation of receptors. The nature of the dependence upon factors other than stimulus is not always satisfactorily outlined. Herrick emphasizes the effect of varying synaptic relations within the subcortical centres through which the afferent impulse passes on its way to the cortex. The lower-level activity is mediated into the cortical process. The doctrine of specific energies is further to be modified in the sense that the actual sensory consciousness is dependent not only upon the afferent path to the cortical projection center, but also upon the specific synaptic organization within that center (*cf.* McDougall). This organization may involve predominantly integration with sensory systems or with motor systems of the cortical level, giving us, psychologically, respectively a sensation that is primarily "cognitive," the "bearer" of meaning, of assimilations, of apperceptive integrations, of imageless thought, and a sensation that is predominantly "conative," "impulsive" in character, the "bearer" of the consciousness of "impulse" and of "attitudes."

A Reconsideration of James's Theory of Emotion in the Light of Recent Criticisms. J. R. Angell, University of Chicago.

The original criticisms upon James's theory of emotion were chiefly psychological in character and involved most often insistence on the contention that emotion is much more than mere organic sensation. Sully, Baldwin and Irons illustrate various phases of this type of criticism. The James theory was often identified with the quite different position of Lange and at times with that of Sergi.

The first wave of criticism from the physiological side set in with the investigations of Sherrington in 1900. The last representative is the recent work of Cannon. These criticisms are on the whole of decidedly more moment than the earlier and more purely psychological forms of attack which were in part based upon misapprehension and in part were irrelevant to the real issue which James undertook to raise. This physiological critique, however, is chiefly directed to questioning the significance of purely visceral sensations and reactions in emotion. James's doctrine is a much wider one than this type of criticism implies.

The outstanding element of importance in James's doctrine is the instinctive character of the emotional reaction, the widespread organic disturbances characteristic of the stronger emotions and the "backlash" effect upon the brain of these motor and glandular disturbances. No evidence has as yet been brought forward successfully to combat the positive parts of James's doctrine. It is, however, in point to attempt a slight revision of his formulation, which will do justice to the various features of emotion other than organic sensation, while at the same time emphasizing anew the essentially instinctive character of the reflex wave set up by the emotional stimuli and reflected back into the cortical activities.

Concerning the Image. H. S. LANGFELD, Harvard University.

The purpose of the paper is a defense of the image, not, however, by direct argument for its existence or by a description of its quality, but by enumerating a few of the situations in which it occurs and suggesting its possible usefulness. The existence of the image is, therefore, from the outset assumed as a fact with the hope that what follows will strengthen the assumption. The writer is in full agreement with the positive contributions of the behaviorists, but is not satisfied with the limitations involved. The functional value of the image is emphasized and meaning is defined in terms of action. Attention is directed to the representative value of the image, especially as a cue for definite attitudes, which function it shares with sensations objectively aroused. In order to illustrate the nature and purpose of so-called irrelevant images a description of an experiment in inhibition with a brief account of the introspective results is introduced. The experiment consisted of the inhibition of firmly linked associations such as certain letters in the repetition of the alphabet and numbers in the numerical series. An explanation of the functioning of such imagery through the radiation of motor impulses is suggested. This leads to the question of the relation of imagery to concept. The emotional accompaniment of imagery and its well-known value in æsthetics is called to mind. Finally there are a few words upon the degree of reliability of introspection.

The Psychological Antecedents of Phrenology. M. BENTLEY, University of Illinois.

Phrenology, as it was established a century ago by F. J. Gall, contends that mental traits and mental capacities rest upon neural functions, which depend, in turn, upon the constitution and size of separate and distinct organs of the brain. The doctrine derives, in part, from the French psychology of the eighteenth century, and, in part, from the German empiricists and rationalists of the same period. From the one side, Gall was especially influenced by the sensationalism of Condillac, Bonnet and Cabanis, and so ultimately by Locke; and from the other side, by Wolff and the later representatives in Germany of the doctrine of faculties. Although the two sources were not so diverse as they are commonly supposed to be, the one laid emphasis upon the more passive, the other upon the more active aspects of experience. In the union of the two historical tendencies, Gall established a middle course which was well designed to support his theory of psychophysical dependence, a theory which has exerted a powerful influence upon the subsequent development of the doctrine of localized functions within the brain.

Psychological Justifications of Punishment. E. Faris, Iowa State University.

Like all ancient institutions, punishment has been defended for a variety of reasons. Some of these are ethical and metaphysical but the more important of the recent ones are frankly psychological, being either assertions concerning the original and primary instincts or formulations of the effect of certain experiences, such as suffering, or the sight of it or its contemplation. The great reform in criminal procedure under Bentham and Mill was founded entirely on a psychological principle now no longer considered valid. It assumed that men act from love of pleasure or fear of pain, and advocated the mitigation of the penalty on the ground that a lighter infliction would produce the desired effect, and that it was undesirable to waste the pain. While the fallacy of the assumption is generally admitted, it is noteworthy that most of our American courts are proceeding on this as valid.

A more recent position defends punishment on the basis of the instinct of retribution. McDougall and Sharp have written in defense of this. It is argued that any tendency to contemplate a criminal act without a desire for retribution is abnormal. This view neglects the essential fact that no act is judged in the abstract. Any offense against the moral law is reacted to with reference to the relation of the offender to the one who judges. Any given act committed by a friend, a neutral, and an enemy, respectively, is not one act but three, and is reacted to with great difference in each case. "Eye for eye" is not an instinctive or emotional reaction; it is rather cognitive, restrained, and mathematical.

A third justification of punishment has to do with the assumed innate desire to make atonement, present in the case of the normal offender. But this can be shown to be due to social experience. It is true that in societies where punishment is administered there is such a feeling, but in the non-punishing communities it is entirely absent. Hence it is not a native instinct and cannot be used to justify the very institution that caused it.

Reformation is claimed as a justification for punishment but this is always due to the concrete and social treatment the criminal receives, and not to the abstract and mechanical punishment. If punishment be necessary, it is a necessary evil with no adequate psychological justification.

The Crowd: A Psychological Study. H. Clark, University of Illinois.

The problem of the psychology of the crowd is not a study either of individual minds or of an hypothetical social "oversoul," distinct from the minds of the members of the crowd. The first conception overlooks the patterning and integration of the individual members, and the second misinterprets the meaning of social organization. In solving the problem, it is not enough to cite a number of alleged characteristics of the crowd. A complete psychological description should include (1) the conditions under which a crowd forms, continues to exist, and finally dissolves, (2) the distinguishing mental characteristics occurring at each stage, and (3) the laws of the patterning of crowdish consciousness in both its temporal and spatial aspects. A psychological explanation should seek, by reference to the principles of mind, to interpret each significant phase of the phenomena examined. If such a plan of procedure is followed, an exposition of the psychology of the crowd may analyze and explain the facts without distorting them, and, moreover, it may be scientific without seeming artificial.

Reëducation after Certain Cerebral Lesions in Man. S. I. Franz, Government Hospital for the Insane.

1. Recovery of Voluntary Motor Control in Cases of Cerebral Paralysis.—When the precentral cortex or the fibers from the cells in that region are affected by hemorrhage or other accident a paralysis results which, if complete, is a hemiplegia. Several so-called irrecoverable long-standing hemiplegics in whom contractures had formed were treated with massage and with passive movements, and it was found that they soon became capable of moving the limbs voluntarily, and that with systematic exercises they gradually increased in motor ability to such an extent that they approached the normal. Assuming the accuracy of the clinical diagnoses with respect to the cerebral lesions, the results indicate the necessity for alteration of the generally accepted views regarding the functions of the cortical "motor" region of the brain.

2. Reëducation of Aphasics.—Successful attempts were made to get several aphasic patients to acquire the names of objects, to read, and to write. The curves of learning show the slowness and the difficulty of learning, and they suggest that new neural pathways, or new neural adjustments, are made in the relearning rather than that the old are utilized. During the course of the reëducation marked fluctuations in ability were found, and these are noteworthy in connection with other previously noted facts regarding the fluctuations in cerebral activity.

Movement, Cœnesthesia, and the Mind. G. V. N. Dearborn, Tufts College.

Laboratory research in psychology has failed to *explain* the mental process. Perhaps far too little time has been devoted to understanding the immediate relations between the body as an organism, at once developer and adapter of the soul, and the mental series proper. We need much more casuistic introspection based on functional anatomy and physiology; recent disclosures demonstrate anew this real need.

The organism by its inherent nature is in universal movement, both active and passive, and continuous both in time and in space. The universal muscular tonus, equilibrium, reaction-basis, the reciprocal innervation of functional antagonists, irradiation; reflexion, volition; mechanical respiration, circulation, digestion, excretion, are conspicuous topics under which the universal organic motion might be examined into. To deny as "unproven," "illogical," etc., the immediate relation of this universal movement with mind is little short of jugglery with the truth, denying the very ground of the whole category Life.

Cœnesthesia is the sensory and subsensory aspect of this universal bodily motion, director of the soul's important business. Its details in every portion of the organism should be known to every psychologist as the very elements of his subject. This sensation-fabric lends the meaning to life because it is in an important sense the dynamic index of our personal evolution and of our adaptation to our kinetic surroundings both spiritual and material. Its reality is in no wise lessened by its partial action in the dark.

The practical educative, prophylactic, and therapeutic values of cœnesthesia are great, but as yet are relatively undeveloped save in just the wrong direction. The new work of the psychopathologists and of the physiologists lends new dynamism to the subconsciousness, to which by integration of the cœnesthesia we arrive. However much in addition it may mean, the transcendental "over-soul" expresses this phase of the mental process. Only by elaborating this moto-cœnesthesic relationship can psychology become really explanatory and so take her rightful place as queen of the sciences.

The Etiology of Mongolian Idiocy. H. C. Stevens, University of Chicago.

The various theories with regard to the causation of this peculiar form of idiocy are unsatisfactory. These theories are: (1) Maternal exhaustion; (2) pressure on the basal ganglia of the brain by shortening of the antero-posterior diameter of the skull; (3) Mongolianism is caused by agenesia of the cortex. An investigation of the cerebrospinal fluid of thirty-eight cases of Mongolian idiocy shows that the condition is caused by parental syphilis.

The New Psychological Laboratory of the University of Michigan. J. F. Shepard, University of Michigan.

The laboratory occupies a portion of the new natural science building. The available space is cut into 40 rooms. On the first floor is located a class room, a shop, a research room with light-tight shutters and containing a concrete pier set in a bed of sand, a small storage room, rooms for keeping animals, and a room especially designed for work with the maze and for other work in comparative psychology. The second floor has offices and private laboratories for the staff, a phonetics room, dark rooms and rooms with light-tight shutters and light walls for work in comparative psychology. Nine rooms, including a dark room, shop, olfactory room with exhaust hood, chronometric rooms, etc., for use by the general experimental class are on the third floor. On the fourth floor are a sound-proof room, other connected rooms for acoustics, a series of research rooms and a system of dark rooms in which a clear space over sixty feet in darkness may be obtained. These dark rooms may be used in various combinations and have an optics room with neutral gray walls in connection. The optics room and dark rooms have north windows as well as skylights, all of which are equipped with light-tight shutters.

All rooms are wired so that they can be interconnected through a central switchboard system and also supplied with low-voltage currents from dynamotors and storage batteries. Tubes in the walls and in the floor slab make possible other connections between several rooms. All parts of the laboratory are well supplied with alternating and direct currents, waste, gas and compressed air.

Lectures to large classes will be given in the main lecture room of the building. The laboratory is located adjacent to the library in which practically all psychological journals are on file.

Facilities for the study of other sides of animal behavior are provided in neighboring rooms belonging to the zoölogical laboratory.

A Questionary on Psychological Terminology. K. Dunlap, Johns Hopkins University.

The Johns Hopkins Chronoscope. K. Dunlap, Johns Hopkins University.

Studies in Experimental Psychology

The Better Retention of Longer Memory Lessons. R. S. Woodworth, Columbia University.

The fact that a long list of nonsense syllables, or other similar lesson, once learned, is better retained than a short lesson of the same kind has usually been explained by the greater number of readings needed for learning the longer lesson, and the consequent overlearning of parts of it. This explanation does not cover the following fact: when, by the method of paired associates, longer and shorter lists are read the same number of times, the longer lists, though giving the smaller per cent. of right responses immediately after the learning, give a decidedly higher per cent. than the shorter lists after the lapse of 48 hours. The long list is found, by a variety of experiments, to act as a stimulus to extra effort, directed chiefly to the discovery of significant connections between the terms to be associated, and these significant connections are better retained than the more superficial "rote" associations that suffice for the temporary mastery of a short and easy lesson.

The Measurement of Attention. K. M. Dallenbach, Ohio State University.

The present study is an attempt at a measurement of attention in terms of the attributive clearness of the cutaneous sensations aroused by an electrical stimulus. The anode was placed at the back of the neck, and the cathode on the dorsal side of the forearm. The electrode upon the forearm consisted of three concentric brass rings, any one of which could be used as the positive pole. The differences between the areas stimulated by the three rings were supra-liminal.

Two methods were used. In one, the Single Task Method, the observers were asked to direct their attention to the cutaneous sensation and to attend from all distractions. Various distractors were used under this method to compel the lower degrees of attention. While a slight variation of attention occurred as a result, the lower degrees of clearness were not obtained. To this end the Double Task Method was employed. In these experiments two tasks were set to be performed simultaneously. The observers were directed either to attend to the adding of a list of figures which were presented auditorially and to react to all changes within the cutaneous sensations; or, to attend to the subtracting of a given list of figures from a certain starting number and to react to all changes within the cutaneous sensations as before.

Immediately following each experiment, which was twenty minutes in duration, the observers were asked to grade introspectively the clearness of the impressions during the interval. Upon the basis of these introspective reports and the character and nature of the objective work performed, the following conclusions are drawn: First, attention may be measured introspectively in terms of attributive clearness. Second, introspectively distinguished variations of clearness are closely paralleled by corresponding differences in the accuracy of the work performed, in the rate of reaction, and in the degree of precision as expressed by the mean variation. Third, a close correlation exists between accuracy and rate of report. Fourth, as a corollary, the normal type of consciousness is the dual level type.

Visual Discrimination of Rectangular Areas Illuminated by Varying Degrees of Achromatic Light. G. F. Arps, Ohio State University.

The primary aim of this study is to determine the efficiency in the perception of differences in length of areas and to analyze the various factors involved in judgments of two-dimensional space.

The variables (comparative stimuli) were presented alternately with the standard stimulus. Twelve judgments were taken of each illumination for each of three observers. All judgments were based on the variables, "greater," "less," or "equal."

The chief results are as follows: (1) Maximal and minimal discriminative efficiency is found at 2.29 c.p. and 4.74 c.p. illumination respectively. (2) Equal, plus or minus differences between the standard and variable stimuli are predominantly judged "plus." (3) Contrast effects render the standard stimulus subjectively variable. (4) So far as could be introspectively determined, eye-movements appear to play no rôle in a judgment when the eyes were left "free"; increased eye-movements act as a distraction and decrease accuracy of judgment; inhibition of eye-movements increases accuracy of judgment. All observers agree that the judgment of a variable as "greater" or "less" is based on the absolute value of the variable, independent of any conscious reference to the standard stimulus. A variable judged "greater" or "less" appears to be immediately perceived as an expansion or shrinkage of the variable. It is probable that the immediate revelation of the judgments "greater" or "less" is correlated with the extent of surface stimulation of the retinae.

An Exceedingly Rare and yet Typical Case of Color-Blindness.

M. F. Meyer, University of Missouri.

It is practically agreed among psychologists that four colors or chromas are distinguished from all others in the following respect. The largest number of colors of which it can be said that none of them resembles any of the others within the group, is four, and these four are no others than red, green (not Hering's Urgrün, but common green), blue and yellow. I call these four singular colors in order to distinguish them by this name from all others, which are dual in the sense of resembling two of the singular colors. We subdivide the singular colors into two groups of two antagonistic colors each, red-green and blue-yellow. But a different kind of subdivision is forced upon us at the same time. Even in the psychological literature of fifty years ago we find it mentioned that, relative to yellow and red, blue is somewhat similar to green; and likewise red is somewhat similar to yellow, relative to blue and green. This latter subdivision is confirmed by a rare case of color blindness. To the subject in question blue and green are more than similar; they are called the same color, our green appearing often as the less saturated one. And red and yellow are to him the same color, our yellow being often the less saturated one. It seems plausible to say that, at a time when only two chromas existed, Nature vacillated between establishing one type of animals having the dividing point in the spectrum, for the processes of assimilation and dissimilation (in the sense of Hering), in the (normally) bluish-green region, and a second type having the dividing point in the yellowish-green region. An ordinary two-chromatic subject (red-green blind), when asked to point at the division point in the spectrum, points at the bluish green region; on one side everything appears one color, on the other side everything is another color. The gentleman in question points at the yellowish-green region; on one side everything is one color which he calls, to please you, either green or blue, on the other side everything is another color which he calls, to please you, either red or yellow. He says that he hears people talk about red and green more than about blue and yellow. He does not need more than two names for himself. After some vacillation, Nature has let the former type prevail in evolution. But there is a trace of the latter even in our present normal, four-chromatic color sense, cropping out in the relative similarity of blue with green and of red with yellow.

The Nature and Origin of Binaural Beats. J. Peterson, University of Minnesota.

Binaural beats have usually been explained as due to the common action of both tones in the same ear, brought about by bone conduction. It has been shown that if a sounding fork is held before one ear, without actual contact with the head, the skull may be thrown into vibration. With a specially constructed microphone one can, in such a case, hear the tone by auscultation on any part of the skull.

It is known, however, that there are important differences between binaural and monaural beats. The former are less distinct and shift peculiarly from side to side. It is found, too, that they are harder to count than the monaural beats; that the probable error of their counts is large; and that at certain frequencies there is a likelihood of the number counted being twice the actual number. The extremely short time required for cross-conduction of the wave through the bone cannot account for these differences. When binaural beats are very slow it is found, if the absolute pitch of the primary tones is low, that the shifting of the beats is due to the tendency to locate the sound entirely on the side of the advance phase. The source of the sound thus seems to shift from side to side. That phase differences are thus perceived is now generally admitted. Binaural beats are therefore not real beats, but a shifting of the apparent source of the sound. The possibility of some degree of bone conduction is not denied, but the effect of such conduction from weak tones is found to be negligable, probably imperceptable. This position is strengthened by results of carefully controlled experiments on a subject totally deaf in one ear. A weak tone conducted through a tube, or along a metal rod, to the deaf ear was not heard at all. When simultaneously with this one, another tone of slightly different pitch was produced at the good ear there was no beating noticed. Two forks, slightly out of unison, held at the deaf ear were not heard, and they produced no perceptible beats. It is well known that inaudible tones may produce audible beats, but these did not even have such an effect.

Binaural beats are evidently to be explained on the same principle as is the perception of phase differences. Both seem to be cortical in origin, while monaural beats likely originate in the basilar membrane. Combination tones, both "subjective" and objective, are in all probability objective in origin to the basilar membrane. For the production of "subjective" combination tones both wave-series must operate in the same ear.

The Cutaneous Sensitivity of the Tongue as Affected by the Loss of the Chorda Tympani. S. B. VINCENT, Chicago Normal College.

The tests reported in this paper were made on a tongue in which, due to the loss of the *chorda tympani*, there was no power of taste on the anterior two thirds of the right side. The case was one of many years' standing but the clinical history must be neglected here. Standard tests were made for touch, pain, temperature, chemical sensitivity and two-point discrimination. Different taste substances and common foods were also used to see if identification could be made on a tactual-thermal basis. Series of tests were made on both sides of the tongue to establish thresholds. Simultaneous and successive application of stimuli to the two sides gave material for comparative judgments. In some series where the judgments failed to show equality the intensity of one stimulus was raised or lowered until the two were pronounced equal.

The results showed that the thresholds for touch, temperature and pain were practically the same on the two sides of the tongue, but that the subjective intensity aroused by the stimulation of the sound side was much greater in every cutaneous sense tested. The subject was naïve. When the stimuli applied to the two sides were the same, such reponses as these were constantly heard: "They are both warm but the left side is much warmer," "Yes, I feel them both but you are pressing harder on the left side," "The one on the left is sharp," etc. One explanation of these results which might be offered is that in addition to the loss of taste fibers there was also some small diminution of the general cutaneous supply to the tongue. In the event, however, one would expect to find differences in the respective thresholds of the two sides. Others have observed in similar instances a lessening of the cutaneous sensitivity, and have suggested that it might be a result of the swelling and degeneration of the nerve, or to the toxic products of degeneration. These observers, however, instead of permanent diminution, reported only a temporary disturbance.

The more probable explanation of the results is that the greater liveliness of the sensations arising from the left half of the tongue was a consequence of the presence of the gustatory element which may be aroused by pressure and possibly also by temperature, and that the subjective intensity was more or less a matter of the whole sensory complex aroused, and not entirely an attribute of any single element, however prominent.

The Nature of the Feeling of Recognition. E. K. Strong, Jr., George Peabody College for Teachers.

Using lists of twenty rather difficult words it was found that the median free-association reaction-time was 1.33 sec. When this same list was repeated five minutes later the median reaction-time for the word that elicited identical responses in both cases was 1.09 sec. There was a gain, then, of 0.24 sec. in reaction-time to the same word when it called forth the same response on two occasions five minutes apart. The corresponding gain when the intervals were, respectively, one hour and one day, were 0.18 sec. and 0.10 sec. These gains stand in a ratio of 100 to 78 to 44.

It has been found that 72.7 per cent. of twenty words may be recognized by the same subjects used above after five minutes, 57.3 per cent. after one hour, and 28.8 per cent. after one day. These figures stand in a ratio of 100 to 79 to 40. There is here a direct relationship between fading recognition ability as time proceeds and the difference in association-time for the two reactions for the same intervals of time.

We believe that recognition is based on the "ease" with which the nervous discharge passes over the associational pathways, and we believe that this "ease" is measured here in terms of reaction-time. Recognition is then due first of all to the fact that when an object is seen again it arouses the same associations that it did when it was first seen. The nervous current traverses the same pathways again that it did before. This condition is essential for recognition but it is not the explanation of the feeling itself. The feeling arises as a conscious awareness that the second discharge has flowed with more difficulty than if it had been a discharge to an old familiar object. This ease may be measured objectively to some extent at least in reaction-time. It is estimated subjectively in terms of feelings of strangeness or familiarity.

Contributions to the Study of Judgments. J. Jastrow, University of Wisconsin.

The writer has under way a considerable series of studies of judgments of various types: sensory, in terms of specific qualities and of impressionistic totals; æsthetic; moral; logical; and of qualities combined, such as judgments of difficulty, confidence, value. A point of special interest is the variability of such judgments with reference to the type of judgment, the psychological process decisive in the issue, the personality, education, temperament, social station of the judges. A few illustrations of preliminary results in such a comparative study are presented. A further special interest attaches to the determination of agreement and variability of the judges individually or in groups. What shall we mean by agreement? That of an individual with the average seems the most usual interpretation. The results of a study of language sensibility are presented in some detail. These judgments are as complex as any readily amenable to the methods employed; the standard method is that of selecting ten comparable instances and arranging them in order in which they present the judged quality. In the case of the linguistic judgments, this quality is that of offense. A curve shows the measure of agreement in groups of 12, 8, 6, 4, 3, 2 judges. Such a group may be called a jury. The agreement follows a clearly defined law in terms of the number in the group. The limit of this is a jury of 1, or the agreement of an individual with the average. There is further possible the standard of the chance agreement of any person in a group with his neighbor; this is lower, and again in a definite relation. Other characteristics of such judgments are considered, such as the type of judgments in which an objectively correct order is possible, and one in which no such order exists; the factor decisive in the issue, etc.

A Quantitative Method of Investigating the Evolution of Concepts. C. L. Hull, University of Wisconsin.

The material from which a given concept was formed, consisted of a series of Chinese characters having certain common strokes. The rôle of language in the process was taken by a single Chinese word which referred alike to all the characters of any given concept-series. To further approximate actual conditions, twelve concepts were abstracted simultaneously. One member of each concept-series was placed on the drum of an automatic card-exposure apparatus and each exposed for five seconds, the concept name of each character being pronounced at the end of two and one-half seconds, until all were learned. Another member of each of the twelve concept-series then replaced the characters already mastered, and these were learned as before. This was continued until the twelve concepts as a whole or individually had attained any desired degree of perfection. This degree of perfection was indicated by the decrease in the number of promptings required to learn each succeeding set of characters, and also, if desired, by the ability to identify new characters belonging to the same concept-series.

It was found that the curve of abstraction plotted in terms of concrete experiences is about midway between that of learning and that of forgetting for similar material. The method of abstraction is largely that of trial and error. The individual concepts are curiously vague and unrecognizable at first, later become schematic and at length approach perfection in detail. In one study, twice as many errors were made on a recognition test where the concepts had been evolved by proceeding from the complex to the simple as by proceeding from the simple to the complex.

Estimations of Speeds of Automobiles. F. E. Richardson, Drake University.

A group of 102 adults, mostly college students, were asked to estimate the speeds of passing automobiles. These machines were driven at given rates of speed along an asphalted street from which other traffic was barred for the time being. Three automobiles, a 1916 eight-cylinder Cadillac, a 1915 Ford five-passenger touring car, a 1913 five-passenger Ford, and an old Excelsior motorcycle were used. The cars were numbered 1, 2, and 3 with large placards, and passed in irregular order and at irregular intervals a given point at which the observers were stationed. The driver of each car was given a schedule of rates to be maintained, and an assistant in each car recorded the actual speed of the car as it passed the observers. The rates of speed varied from 6 to 68 miles per hour. The tables of estimations of each observer, judging independently, were collected and tabulated and curves were plotted showing the judgments for each of the twenty-nine trips.

The estimations show marked irregularity and variability depending upon the size of the car, its noisiness, the rate at which it passed, the contrast of that rate with one just previous, and the amount and kind of experience which the observer used as a basis of comparison. At high rates of speed the observers were biased by their estimation of the probable maximum rate for such a car, resulting in marked underestimation.

Such a test serves three purposes. It is a valuable class exercise in which every member takes an active part; it affords material for the analysis of a complicated perception and judgment, and from a legal point of view it demonstrates the inaccuracy and variability of such judgments and some of the factors upon which they depend.

Estimations *en route* by automobile drivers and passengers have been collected which reveal an even more complicated judgment. Visual, auditory, cutaneous, kinæsthetic and organic impressions seem to contribute to such judgments.

The Solution of a Series of Puzzles. C. WHITE, Indiana University.

The study is essentially an effort to provide in a simple problem the conditions and factors involved in invention; to note and to analyze the methods of response to a novel situation. It is similar to Ruger's study in the "Psychology of Efficiency" in that it is distinctly an effort to analyze the "problem consciousness"; it differs from his study in that the puzzles are a series, much more intimately related than Ruger used, though without sacrifice of novelty. This relation makes it possible to study in the original situation the various aspects of learning, such as utilization of previous experience, transfer, etc.

The puzzles are based upon a simple Japanese puzzle, a block of wood cut into four pieces. Each puzzle differed from the preceding one by an increase of one in the number of pieces. The same general scheme characterized the entire series. Sixty college students, all of whom had received training in the psychological laboratory, 'attempted the solution of the series in a 50-minute period. All tentative arrangements of the blocks made by the subjects during the effort at solution, were recorded by the experimenter. These sketches with the time record and introspections provided the data.

The results indicate that a novel situation of apparently extreme simplicity will reveal astonishing individual differences, both in time required for its mastery, and in methods employed. An objective, logical estimate of the difficulty of a situation is not reliable, *i. e.*, Puzzle II seems but little more complex than Puzzle I, yet the addition of a single piece in Puzzle II increases the average time ten-fold. The degree of efficiency in mastery of a novel situation seems to be in direct ratio to the type of analysis employed. The levels of analysis evident in this study range from pure trial and error to complete anticipatory analysis.

The effects of Distractions on the Discrimination of Sounds. F. C. Dockeray, University of Kansas.

In a recent work on the effect of physical fatigue on mental efficiency I suggested that the sensations of physical fatigue may act as an incentive to greater mental activity and therefore show greater mental efficiency than under normal conditions. I also cited what seemed to be parallels, the increased efficiency caused by outside stimuli that would generally be looked upon as distractions. It has been demonstrated on various occasions that a distracting stimulus presented at the moment of comparison of the length of two lines, for example, is accompanied by increased concentration on the part of the observer and his discrimination is improved.

An attempt has been made in the experiments to be reported to determine whether a continuous distracting stimulus would have the same effect upon attention when the subject is required to discriminate sounds continuously for sixteen minutes. Two types of distraction were used, one a buzzer of moderate intensity placed on the opposite side of the observer from the sounds to be discriminated and the other, a weak induction shock applied to the forearm. The latter varied sharply in intensity at irregular intervals. Otherwise, both distractions were of uniform intensity and continuous.

Seven subjects have been used. Of these four show decreased efficiency with either form of distraction when the distractor is uniform. Generally, when the induction shock increased, even to the point of being painful, the subject discriminated more accurately, though he generally did not think so. One of the remaining subjects shows little effect one way or the other, except the sudden changes in the shock distractor seem to render him more alert. The remaining two do slightly better under conditions of distraction.

A Children's Association Frequency Table. H. Woodrow and F. Lowell, University of Minnesota.

A table showing the responses of one thousand children, nine to twelve years of age, for each of one hundred and twenty words. The Kent-Rosanoff list of one hundred words was used, and on account of the difficulty of some of these, twenty additional ones, making a total of one hundred and twenty thousand associations that have been tabulated. By comparing our results with those given in the Kent-Rosanoff table (obtained mainly with adults), a very complete picture is obtained of the differences in association between children and adults. These differences are very pronounced, even in the case of the twelve-year old children. A few typical illustrations is all that can be presented in the present paper.

An Experiment on the Influence of Training on Memory. E. A. Cowan, Wichita, Kansas.

Children of high school age were subjected to training series during which they were required to isolate pairs of units from a mass of homogeneous material (words or nonsense syllables) and to hold the pairs successively in the focus of attention. At the beginning, at the end, and in the middle of the training series the children were required to stand in front of a table holding thirty-two objects, to learn these objects for two minutes, and then to go into another room and write down all the objects they could remember. At the beginning and at the end of the training series they were given a rote memory test with a prose paragraph. The results of the table tests and the rote memory tests were compared with those of another group of children of the same age who did not take the training series, but who were given the table and rote memory tests simultaneously with those who took the training series.

Studies in Animal Psychology

Provision for the Study of the Monkeys and Apes. R. M. Yerkes, Harvard University.

Experimental studies made by the writer and other investigators have abundantly indicated the scientific importance of thorough investigation of the behavior of the monkeys and anthropoid apes. The writer has devoted considerable time to a consideration of suitable provision for such research and has especially studied the problem of satisfactorily locating a station for such work. In view of all available evidence it seems highly probable that many of the species of monkeys and apes can be kept and bred fairly successfully in Southern California. It is hoped that at no distant date a station may be established at which investigations may be undertaken to be continued uninterruptedly with animals whose ancestry, as well as their life-history, is a matter of accurate record. The advantages of work under such conditions, in contrast with that possible in or about the habitat of most of the monkeys and apes, warrant the expectation of results of great value to the various biological sciences.

A Demonstration of the Dog's Deficiency in Detail-Vision. H. M. Johnson, Nela Research Laboratory, National Lamp Works of General Electric Company.

An English bull terrier which had failed to learn to distinguish a striped field from a similar field of uniform brightness was trained in about two weeks to discriminate between two circular fields of different area and pattern but of equal mean brightness. Control tests showed that the patterns were not effective and that the difference in area was effective only in so far as it conditioned a difference in luminous intensity. The threshold for intensity was between the relations of 2.25 to 1 and 1.44 to 1.

The animal was then required to choose a striped field and to reject a similar field of uniform brightness, in circumstances which insured the formation of a sharp image on the retina, under all conditions, of the fields to be discriminated. The animal failed to learn the problem or to show any tendency to improve in 500 trials. Each stripe on the positive field subtended a greater visual angle than the sun's disc subtends at the earth. The experiment was crucial and the conclusion follows that the dog is not sensitive to gross detail in visual objects, and that the deficiency is due to the relatively poor development of his retina. The result was probably predictable from the anatomical evidence compiled by Vincent, and it presents at least presumptive evidence against the presence of pattern-vision in other carnivora and in rodents and ungulates whose eyes closely resemble the dog's in structure, both as refractive systems and in point of retinal development.

The Effect of Delayed Feeding Upon Habit Formation. J. B. WATSON, Johns Hopkins University.

The purpose of this experiment was to throw light upon the factors which govern the stamping in of successful movements and the stamping out of unsuccessful movements. According to Thorndike the resulting *pleasure* from a successful act stamps in the reaction. Other investigators hold that the stamping in of a successful act depends upon the principles of *recency* and *frequency* and is not dependent upon the pleasantness or unpleasantness resulting from the activity.

A small experimental beginning was made upon this problem. Two groups of animals (rats), closely similar in age, docility, body weight, etc., were chosen. The problem box used was a modification of the sawdust box. The animal had to learn to scratch under a bank of sawdust, find a small hole an inch and a half in diameter, crawl under the sawdust box, and mount through an opening to a raised floor. Screwed to the floor of the problem box was a small metal food dish covered by a perforated metal disc. The metal disc could be opened from the outside. The experiment was conducted as follows: The animal was put into the restraining cage and allowed to work until the problem was solved. With one group the metal disc was raised immediately upon the entrance of the animal and the animal was allowed to feed until his appetite was appeased. In the other group the metal disc was not raised until thirty seconds *after* the animal had entered the problem box. During those thirty seconds the animals in this group were very active, biting and tearing at the metal food dish, running around the cage, etc. At the end of thirty seconds the metal disc was raised and the animals allowed to appease their hunger.

The learning curves for the two groups of animals were almost exactly identical.

Maze Studies with the White Rat. H. CARR, University of Chicago.

The maze when learned is run in kinæsthetic-motor terms. The dependence of this sensori-motor coördination upon the sensory environment in which it is developed was studied by noting the effect of changing such factors as the degree of hunger, cleanliness of paths, intensity and direction of illumination, position and orientation of maze and cage, position of experimenter, and method of handling. Most of these alterations introduced disturbances. A few animals are immune to most changes, and the animals affected are rarely disturbed in every test. Adaptation is readily secured but any adaptation is acquired only for a definite situation, and it is retained over periods in which other disturbances are introduced. Comparing blind animals with those with vision, the blinds as a rule are less susceptible to the changes, adapt to them less readily, exhibit a greater degree of individual variability, and are more erratic and irregular from trial to trial.

The Interference of Auditory Habits in the White Rat. W. S. Hunter & J. U. Yarbrough, University of Texas.

The present study concerns itself with habit interference and the indirect bearing of this upon sensitivity to the tone 256 dv. in the rat. The results are in harmony with data previously published indicating the insensitivity of the rat to the tone in question. Simple reactions were used and the mutual relations of the stimuli were known in terms of response.

18 rats (*A*) were trained to turn to the right through a T-shaped discrimination box for the stimulus of hand claps. A turn to the left was made for silence. After learning, each rat was given controls to determine the effective stimulus. Each was also tested first with 256 dv. and then with the buzzer substituted for the hand claps. All ignored the tone, but reacted to the buzzer as to the hand claps. For a period of 30 days: 4 rats rested; 3 (*B*) were trained on going to the left for the buzzer; 4 (*C*) were trained on going left for 256 dv.; 4 were trained on going right for 256 dv.; and 3 were tested on regular series of presentations without any auditory stimulus. At the end of thirty days, each set was tested for retention of the original habit. During the 30 days no rat learned the problem upon which he was trained. The retention tests indicate essentially equal proficiency for all five sets of animals: Poor retention was anticipated in those rats trained in (*B*) and (*C*), if the latter set could hear 256 dv.

If the last of *A*'s curve is compared with the first of *B*'s, great interference is revealed. The first of *B*'s curve, however, is the same as the first of *A*'s, *i. e.*, *B* ranks as a new habit. Were it less than this its curve would start lower. If the rate of the elimination of excess error for *A* is compared with that of a set that has learned *B* (after having previously learned *A*), it will be seen that *B*'s rate is much slower in the last 0.4 of the curve, although the rates are practically identical in the first 0.6.

Some Experiments on Transfer of Learning. H. H. Wylie, Geneva College.

During the year 1913–1914 the writer performed some experiments in the psychological laboratory of the University of Chicago, bearing on the problem of transfer. Our specific purpose was to study transfer between two problems whose differences and similarities could be defined and whose factors could be controlled. The subjects used were white rats. This removed in large degree the complications arising in the ordinary experiments on this problem from the presence of uncontrollable central factors. A problem-box was used whose controlling stimulus was a light. After response had been learned to the light, a sound or pain stimulus was substituted. Or a light or pain stimulus was first used and a sound substituted. The response was kept the same in all cases. The most interesting result bearing on the learning process was the fact that most of the learning curves do not show a rapid initial progress nor a gradual progress throughout the learning period, but an initial period of practically no progress, then a rather sudden or complete mastery of the problem. The results bearing on transfer indicate (1) that it is an advantage in learning the response to one sort of stimulus to have learned first the same response to another sort of stimulus and (2) that any loss due to substituting a different stimulus can be overcome by giving the two stimuli simultaneously for a number of trials.

The Effect of Strychnine upon Habit Formation. K. S. Lashley, Johns Hopkins University.

The influence of many drugs upon sensory thresholds, inhibitory and reinforcing processes, and motor coördination offers a possibility of testing the rôle of such factors as frequency, vividness, and recency in the fixation of the neural pathway. Tests have been carried out upon albino rats with the view to determining the effect of strychnine and caffeine upon the rate ot learning the maze. The graphic maze was used to get the records of the number of trials and the time, distance, and number and character of errors in each trial. The drugs, strychnine sulfate, and caffeine (pure alkaloid) were given by subcutaneous injection in 0.1 c.c. of water, 10 minutes before each day's training, and training was continued for five trials per day until three successive errorless runs were made.

The comparison of strychninized rats with controls receiving only water has been continued with very careful control of age, sex, ancestry, and methods of training. Owing to the greater average weight of the rats in this second experiment the amount of strychnine administered per unit of weight was less than in the first test which probably accounts for the slighter effect of the drug.

The results thus far indicate that: (1) Strychnine in large doses facilitates learning. (2) Caffeine in the amount used probably retards learning. (3) Retention is not affected by these alkaloids. (4) Variations in the effect of strychnine upon different individuals suggest that the favorable effect of the drug is correlated with general motor disturbance as opposed to sensory or emotional changes. (5) No serious after effects of the continued use of either drug has been observed.

The Effect of Alcohol on the Intelligence of the White Rat. A. H. Arlitt, University of Chicago.

These experiments were undertaken to determine the effect of large and small doses of alcohol, administered for periods of varying lengths, upon the intelligence of white rats. Alcohol was administered to all groups throughout the training periods. Rats fed two c.c. and three c.c. daily died after a short period.

Maze learning was the problem chosen to test their intelligence. The rats were given one trial every other day. Normal controls raised under the same conditions were run at the same time. Rats fed alcohol average a longer time in the maze and make more errors, both at the beginning and during the latter part of the training period, than normal rats. This was the case in all groups. Records of rats fed alcohol for sixteen days showed more irregularity than those of rats fed for longer periods. Two groups of rats trained in the maze until eight out of ten trials were made without error were then fed two c.c. and three c.c. per day. Only in the latter case was the behavior affected seriously during the first two months. Both sets were longer in the maze and averaged more errors than the normal control set during the last two months of the feeding. These rats were run twice a day.

Male and female rats of all groups have been mated with other rats of the same group and with normals. Only four litters have been produced. Two litters were eaten immediately after birth. Two of the six young in each of the surviving litters were born dead. The remaining four in each litter are now being trained in the maze. The records of both sets show marked irregularities, one rat having failed entirely to learn under ordinary conditions of learning. One of these sets is the result of a mating of an alcoholized rat fed two c.c. per day for seven months, the other of two rats from a group fed one half c.c. per day for five months before mating.

STUDIES IN EDUCATIONAL PSYCHOLOGY

Research as a Means of Teacher-Training. G. W. A. LUCKEY, University of Nebraska.

From the genetic viewpoint, education may be defined as the vital change wrought in the growing individual through the interaction of determining inner and outer forces, nature as modified by nurture. It is an acquired product which, to be vital, must be worked on and into the inherited complexes, organisms, instincts, feelings, desires, etc., known as nature. At bottom all men are one. It is only in the later developed complexes and instincts that humanity differs. Teaching is the conscious effort of one individual to direct or shape the activities of another. It is vital only to the extent that it gives to the taught greater initiative and self-mastery. In order that the teaching may be intelligent and in harmony with the laws of nature there must be a deeper knowledge of human growth and development. This knowledge is to be gained only through properly directed research in the workshop of life.

To teach or build one must have definite aims, and these aims must be true and realizable. True teaching brings others to see and live what you see and live. The teaching of today is directed toward three different ends or aims. According to the first, the purpose of education is to fashion the individual in the image of the past, usually the best past. According to the second, the purpose of education is to fit the individual, at least in part, to the needs and activities of the present. According to the third, the purpose of education is to develop a man, the best man possible under the conditions; to assist nature through nurture; to enable the individual to find himself; to evolve naturally and rapidly to the highest levels, even to rise above them. To see and appreciate this ideal of education research is necessary.

A study of the mind of the child reveals three important instincts fundamental to intelligence. These instincts are shown through the early desire to know as expressed in the three groups of questions: "What is it?" "Why is it?" "How is it?" Here we have the fundamentals of science, philosophy and art. It is the dominant interest of science to discover the facts; of philosophy to explain and interpret them; of education (teaching) to distribute and vitalize them. The scientist should not stop with the gathering of facts, the philosopher in interpreting them, nor the teacher in giving for truth what is not truth.

Some Measurements of the Effect of Reviews. H. A. PETERSON, Illinois State Normal University.

The purpose of the study is to get some measures of what reviews accomplish under conditions similar to those of school work. The subjects were normal school students in classes of from 45 to 75. The class was divided into two groups of about equal ability determined by means of a prose-substance test. All were then given 2½ minutes for studying a passage 25 lines long, followed by an immediate recall (written) for which a maximum of 12 minutes was allowed. The aim was to reproduce as much of the substance as possible. In grading one point was allowed for each idea. A week later while one group was occupied with the class work, the other reviewed and re-wrote the passage, the purpose of this re-writing being simply for fixation. Two and one half minutes were again allowed for reading, and a maximum of 12 minutes for writing. In some classes there were three groups, the third group receiving a second review two weeks after learning. Three, four, six, or eighteen weeks after first studying the passage, the final recall which measured the effect of the review came.

The results so far are: After three weeks the one-review group recalls 1.89 times as much as the no-review group. After six weeks the one-review group recalls about 1.33 times as much as the no-review group, and after eighteen weeks the superiority of the former has sunk to about 25 per cent. After six weeks the two-review group recalls about twice as much as the no-review group, and after eighteen weeks the former recalls 1.8 times as much as the latter.

While the reviews here used were undoubtedly thorough, the results probably exceed the most common expectations. While the effect of the review, like that of the first learning, decreases rapidly at first, and later more slowly, a substantial residue remains after the sixth week. All of the results were obtained from the use of a single historical selection of only moderate difficulty.

The Learning Capacity of Negro Children. W. H. Pyle, University of Missouri.

In a former study of negro children, it appeared that negro children have about two thirds the mental ability of white children.

In the present study, I have tested the learning capacity of negro children, as compared with white children, by means of a new learning apparatus designed by the writer. The type of learning is that of building up a set of motor associations and coördinations. One hundred and thirty negro children from the fourth grade to the seventh were tested. All the children in these grades were included. The children in a white school were similarly studied. It appears that negro children have three fourths to four fifths the learning capacity of white children. The advantage claimed for this study is that we have eliminated, to a large extent, the effects of experience and environment.

A Comparison of Deaf and Hearing Children in Visual Memory for Digits. D. G. Paterson, Ohio State University.

Four hundred and eighty-one deaf children ranging in age from seven to adults were tested for their visual memory for digits. Each deaf child was tested individually by means of a small portable tachistoscope. This consisted of a box whose inside measurements were $\frac{1}{2} \times 1\frac{1}{4} \times 15\frac{1}{4}$ inches. An aperture or window on the top side measured $\frac{3}{4} \times \frac{3}{4}$ inches. Strips of cardboard were inserted in the open end of the box. The top card was then withdrawn, slowly exposing one digit at a time for about one second. There were two exposures of the same number of digits. Series of digits began with two and ended with seven. The score recorded was a plus or minus for each series of digits. Wrong order was counted minus. The digits were printed in blue type and measured $\frac{1}{4}$ inch in height. After each series had been exposed, subject immediately recorded in pencil on paper what he could remember.

The results are given for deaf pupils orally taught, and for those manually taught as well as for all of the deaf children combined. These results are then compared with the results obtained with hearing children, by Smedley.

The deaf children tested are extremely poor in immediate recall of the digits, not equal at any age to the ability of seven-year-old hearing children tested by Smedley.

To show the effect of the absence or presence of auditory experience the children were grouped according to age when becoming deaf. In general the results indicate that the greater number of years of auditory experience before becoming deaf, the greater efficiency of the individual in visual memory. This proof of the importance of previous auditory experience is also supplemented by the fact that other tests which do not involve the auditory factor do not show the deaf child to be so handicapped as compared with hearing children.

The Analysis of Typewriting Habits. M. E. Haggerty, University of Minnesota.

Bryan and Harter called attention to the hierarchy of language habits involved in the learning of telegraphy. They specified three orders of habits, namely, letter habits, word habits, and discourse habits. In his study of the acquisition of skill in typewriting, Book notes all of these as specific habits operating against a background of "general habits." The investigation here reported is an attempt to identify these specific habits somewhat more accurately and to rank them in an order of importance for efficiency in learning. The major part of the work has been to analyze printed matter in order to see what letter combinations occur most frequently. This work begun several years ago has been greatly facilitated by Ayres's publication of "the thousand commonest words in English writing." The Ayres list gives the relative rankings for each of the thousand words in a hundred thousand words of printed matter. Using this as a basis we have evaluated each two-letter, three-letter, four-letter, and five-letter combination. These evaluations have served for a building of practice exercises which enable a beginner to practice from the start the habits which will be most important to him later. They serve also as a measure of the proper adaptability of exercises in the manuals of instruction and even of the construction of machines. In a similar manner, the data derived from this analysis of habits may be of service to learners and teachers of the linotype. One practice sentence derived from this study is as follows: "He sees our earnest men stand fast in the faith and win."

Twenty beginning students were divided into two groups of ten each. One group followed the manual of instruction formerly in use. The other used the new exercises. At the end of six weeks of practice, the group using the improved method were copying unfamiliar matter faster and with fewer mistakes than the group following the conventional method.

A Study of Transfer in Sensori-Motor Learning. F. N. Freeman, University of Chicago.

The activity studied is mirror drawing, modified in such a way that (1) the hand is concealed, (2) the relation is made more complex, or more difficult to analyze, (3) there is a possibility of an indefinite number of modifications in the relation between the direction of hand movement and of the image of the pen movement. As a consequence of this possibility of modification it is possible to arrange a number of series of trials, the conditions of each one differing from the preceding series in certain specified ways; and, by studying the effect of certain types of modification upon the amount of improvement, or the reverse, from one series to another, to determine some of the factors in transfer in this type of learning. For example, the apparent direction of the pen movement in drawing a figure may remain the same in two successive series, while the direction of the hand movements is modified; or the direction of the hand movements may remain the same in successive series, while the apparent direction of the pen movement changes. In other cases a modification may be made in both elements. These three types of cases were studied in the present experiment using two distinct orders of four series each. It appears, first, that the speed of learning each series may be facilitated or interfered with by the character of the preceding series; second, that whether there is facilitation or interference depends on the relationship of the two series, which is in large measure independent of the specific nature of either series; and third, that the determining factor is not identity in the movements made, or in the perceptual object to which they are adapted, but a similarity in the type of relation between the hand movement and the perceptual object.

Preliminary Report of a Study of Handwriting Movements. F N. FREEMAN, University of Chicago.

The purpose of this study is the minute analysis of the handwriting coördination of writers of different degrees of development and proficiency, in order to distinguish the characteristics of efficient and inefficient types. Two general kinds of facts are being studied: first, the manner in which the elementary component movements combine in the total movement, and second, the temporal characteristics as indicated by the speed distribution among the various strokes, or parts of strokes, for example, the degree of rhythm. The movements are studied by means of motion picture photography supplemented by a modification of the Judd hand-tracer. Preliminary results indicate that certain aspects of finger, hand, and arm coördination, and also certain types of speed distribution are significant as indices of efficient writing.

An Intensive Study of the Development of Reading Ability. C. T. Gray, University of Chicago.

I. This study is intended primarily to determine the differences between good and poor readers, and to provide corrective measures for the latter class.

II. The subjects are pupils in the elementary and high school of the University of Chicago, as well as college students. In many cases the selection of individuals is made by referring to the results of another investigation which is being carried on in the above mentioned schools. These results are of such a nature that they show clearly the good and poor readers. In some instances it has seemed desirable for the writer to visit the elementary school classrooms and hear the children read. The teacher is then asked to send certain pupils to the laboratory.

III. Three general types of test are being given. These may be spoken of as perception tests, motor tests, and measurement tests. The perception tests include the usual work with the tachistoscope and a test with a modified form of the short exposure apparatus whereby the operator can get the span of attention at any point in connected material of considerable length. The motor problems considered are those of eye-movements, breathing, and vocalization during silent reading. Measurement tests are given for both oral and silent reading.

IV. Some of the points shown by the results are as follows: 1. Some subjects are good in silent reading, but poor in oral reading, or *vice versa*. 2. Very often a child does well in one type of silent reading and very poorly in another type. 3. Children show very large differences in the control of the breathing coördinations. 4. The amount of vocalization of some children is so great that their reading may be spoken of as "inaudible oral reading." In a few cases the breathing curve for such silent reading has been found to be almost the same as that of oral reading.

V. Among the corrective measures which the results indicate would be effective the following may be mentioned: 1. Training in breathing. 2. Training in speed. 3. Training in reading for main points.

Mental Tests

Technology and the Laboratory. F. L. Wells, McLean Hospital, Waverley, Mass.

When it is desired to apply the results of experimental psychology to actual life, that is, to make a technology of them, it is necessary to know that the experiments properly correspond with the conditions of actual life. Laboratory methods may interfere with this correspondence as they have been thought to do, for example, in experimental phonetics. In typewriting a divergence between experimental and actual life performance has been found. Adams reports it in advertising. The graded tests of intelligence serve to distinguish a certain class of mental defect. On the other hand, experiments on the higher mental processes in other classes of mental disturbance fail to distinguish such persons from normal individuals, or normal individuals from each other, according to the most important characteristics. The difficulty is perhaps with the laboratory conditions rather than with the experimental method. The experimental method can be directly applied to actual life conditions, as is done in business, advertising for example. The technology of mental life should not, however, be based on experiment. It should be based upon the quantitative study of various significant facts and reactions in life such as birth, breeding, home environment, education, sexual adjustments, income and various factors of success. The most important place of experimental work is as a guide to prognosis. The experimental study of any group must be compared with the later careers of that group to make the experiments of service in this way.

Experiments on Vocational Selection. W. D. Scott, Northwestern University.

A large number of mental tests has been suggested as valuable for vocational selection or for vocational guidance. At the present time there is great need of having these tests tried out in actual practice. It is extremely difficult to find means for checking up the results of tests performed in the interests of vocational guidance, but it is relatively easy to check up the results of tests on vocational selection.

The writer has checked up tests on vocational selection in two ways: first, by testing employees whose ability is known to the employers. Second, by testing applicants and correlating the standing in the tests with the standing after employment. Neither of these methods of testing tests is perfect but both are fairly accurate and are extremely valuable. In securing a rating of the employees, several members of the firm should make independent ratings. There should be a correlation of well above .50 for all the ratings made by the different members of the firm, and there should be a rating of well above .50 between the combined ratings of the firm and the ratings made by the tests. The writer has been able to secure a correlation of .90 and over between the test ranks and the ratings made by a firm. Since high positive correlations have been secured in half a dozen instances, the method seems satisfactory. It seems probable that there is a high correlation between success "in the field" and standing in the tests.

Mental and Physical Norms for Efficient Waitresses, Saleswomen, Factory Operators and House Maids. J. Weidensall, Janesville, Wisconsin.

This paper reports an investigation yet in progress. It represents an effort to establish norms for groups of law-abiding, efficient working women in the tests which were given by the writer to the criminal women of the New York State Reformatory at Bedford Hills. Funds and time have limited the work somewhat, but as many of the tests as possible are being given to the four groups indicated in the title.

We found the work at Bedford ever increasingly to require norms for law-abiding women of corresponding industrial condition and opportunity. The only norms for working women which we could discover were those being established in Cincinnati by the Bureau of Vocational Guidance. As available they represent norms for working girls some five or six years younger than the average woman at Bedford, and included, at least in the form in which we were giving them, only three of the tests we had selected for use at Bedford, *i. e.*, measurements of height, weight and grip. Even so, these Cincinnati norms promised to be so helpful in the estimation of the ability of the Reformatory women to be or to become "efficient working women" that they were forthwith added to our tests.

Meantime, we were convinced that to be safe in our interpretation of our subjects' ability, we must have standards for more of our tests, and that these standards must be based upon the records of women of approximately the same age as the Reformatory group, and of women who had observed the law and succeeded in earning a living in the same range of occupations as they, and under the same complex social conditions as exist in New York City. The outcome is the present investigation.

Attitude as It Affects Performance on Tests. A. F. Bronner, Juvenile Court, Chicago, Illinois.

The study of individuals in the Psychopathic Institute of the Juvenile Court of Chicago, has given us an opportunity of observing the important influence of attitude in relation not merely to learning, but in relation to all performance. By study of the same individual at different times and under varying conditions, we have seen striking differences in the test results—when no explanation other than that of attitude could be found. In many instances, the explanation has not had to be inferred, but had been clearly given by the individual himself.

One can analyze reactions in general behavior and to tests, with sufficient surety to show, in some detail, the various phases of attitude that are elements in the situation and directly affect results. Thus, we have illustrations of deliberate deception, general recalcitrancy, emotional disturbance, under which we enumerate general depression, anger and resentfulness, fear, sheepishness, or feeling of shame, shyness, embarrassment, and homesickness. Then too, there is the general nervous excitement, induced by the desire to achieve a particularly good result.

Bare mention, at least, should be made of the peculiar mental states of the epileptic, and of hystericals, the influence of psychoses, major and minor, the psychic disturbances of chorea, and the mental results of bad physical conditions and of extreme bad habits. Finally, there are instances in which we have different combinations of one or more of these conditions.

A Percentage Definition of Intellectual Deficiency. J. B. MINER, Carnegie Institute of Technology.

More emphasis should be placed on the description of the border lines of social fitness on measuring scales if we are to avoid current absurdities. In the present dilemma the writer advocates a percentage definition of *intellectual* deficiency. The lowest "X" per cent. would be regarded clearly deficient in intellect and the next "Y" per cent. doubtfully deficient. After consideration of important estimates that have been made, illustrative percentages are suggested tentatively. The purpose should be to include among the clearly deficient those whom society might justly isolate, and in the doubtful group those who would be likely to require both special school training and social assistance during life. The percentage definition supposes that the deficients differ only in degree of ability from those who are passable, that the tests at present detect only intellectual deficiency, that the percentage of deficiency is practically the same for each age within the range for which testing is important, and that variability would be cared for in the doubtful region.

The tentative formula is then used to describe the boundaries for the immature and the mature on the Binet scale on the basis of test results. The boundary for the mature is found with the random group of 653 fifteen-year-old school children. Besides showing the effect of the percentage definition in readjusting the boundaries on the Binet scale, it is used to test Stern's "mental quotient" and to indicate how the results of different investigations, say in the field of delinquency, might be compared even when they used different scales. The quantitative definition is to be compared for clearness and significance with verbal descriptions, such as that of the British Commission on Feeble-Mindedness. Its usefulness in diagnosis is to inform the expert how far his opinion receives objective support.

Perceptual Transformations as a Means of Testing Mental Growth. D. P. MacMillan, Bureau of Educational Research, Chicago Public Schools.

In evaluating perceptual capacity it is usual to limit the procedure to qualifications that tests of "performance" emphasize, viz., amount of work, constancy and accuracy exhibited, and time expended. Stress must also be placed upon the transformations that take place in (*a*) content, by comparing the product reproduced with what is presented, and in (*b*) process, or differences evidenced in modes of expressing as compared with ways of acquiring. These changes occurring between getting and giving, should be expressed in terms of transformations or mediation or cross-reference of sense-media. Children as well as adults may be visualizers in receiving, and, for example, acoustic-motors in expressing. Basic transformations are illustrated by the old distinction of primary and secondary qualities of sensations. If the contact-values are the older and the substrate of our mental life, and if human beings must pass through these type-ways of reacting, then determining and rating this gradual transformation ought to enable us to place arrests and retardations within this scale.

Comparative Rank in Mental and Physical Tests of 14- and 15-Year Old Working Children with 14- and 15-Year Old School Children. H. T. Woolley & C. R. Fischer, Cincinnati Bureau of Vocational Guidance.

The working children of this report are the same group for whose tests details are already published in the monograph on "Mental and Physical Measurements of Working Children"[1] and the paper on a "New Scale of Mental and Physical Measurements for Adolescents."[2] The school children are children from the same community, and as far as possible from the same districts, who were intending to remain in school. They were given the same tests, under the same conditions as the working group. The present comparison of the two groups is based on ten percentile summaries of each of the mental and physical measures used. The school children are superior to the working children in every respect, in mere growth, in manual skill, and in mental ability. There is not a single test, mental or physical, in which the working group is the equal of the school group. On the whole, the difference between the two groups is greater at fifteen years than at fourteen years, though this statement does not hold of every test.

The scale of measurements already published for working children, is accordingly too low for children in general. A scale combining the two groups will soon be ready for use.

A Census of Speech Defectives among 89,057 Public School Pupils—A Preliminary Report. J. E. W. Wallin, Psycho-Educational Clinic, St. Louis, Missouri.

The census was made in order to obtain data on the following points: the number of stutterers, lispers and other types of speech defectives in the St. Louis public schools; the number of left-handed pupils in the schools; and the following facts concerning each speech defective: sex, age, grade, years retarded, degree of severity of defect, age of onset, ascribed cause, and whether or not the speech defective was or had been left-handed and whether or not he was a dextrosinistral.

Among the results may be mentioned the following: 2.8 per cent. of all the pupils considered were subject in greater or less degree to some form of speech defect; 1.6 per cent. were lispers; .7 per cent. were stutterers; .4 per cent. had some other form of speech handicap; 71.0 per cent. of the stutterers and 78.7 per cent. of the lispers were mild cases; about twice as many boys as girls had speech defects. The percentage of children who were left-handed was the same (2.8 per cent.) as the per cent. who were speech defectives, apparently supporting the conclusion that there is a causal connection between left-handedness and speech defectiveness. Specifically the claim has been made that training left-handed children to write with the right hand will result in the development of speech disorders. Analysis of our data on dextrosinistrality does not seem to bear out this conclusion and investigation furnishes little, if any, justification for the demand that left-handed pupils must not be forced to write with the right hand on the ground that this will produce speech defects.

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[1] No. 77, Psy. Rev. Mon. Sup.

[2] *J. of Ed. Psy.*, Nov., 1915.

Who Is Feeble-Minded? J. E. W. WALLIN, Psycho-Educational Clinic, St. Louis, Missouri.

It has been accepted as definitely proved that older adolescents and adults who fail to reach a mentality of thirteen years by the Binet-Simon tests are feeble-minded. When measured by this standard the writer found that every one in a group of poorly schooled adults, consisting of four farmers, one business man and one house-wife, all eminently successful in their several callings, all living moral and respectable lives, and parents of mentally normal and healthy children, would grade as feeble-minded whether rated by the 1908 or 1911 scale. Of five freshmen in a teachers' college and one high-school junior, at least four of whom were superior to the average student of equal training, four would be rated as feeble-minded on the most liberal basis of accrediting by the 1911 scale. These results—and other analyses presented elsewhere—lead to the conclusion that the concept of the high-grade moron, and possibly also of the middle-grade moron, must be abandoned.

The present tendency to play loose and fast with such concepts as "mental defect," "mental deficiency," "defectiveness," "feeble-mindedness," "subnormality," and "moronity" is unjustifiable. There are many degrees and many kinds of mental defect, ranging from a specific defect of memory or a slight degree of mental retardation down through backwardness, dullness, "borderlinity," and the various degrees of feeble-mindedness. Innumerable adolescents and adults are now being diagnosed as feeble-minded on the basis of arbitrary standards which prove to be untenable. When tenable standards are adopted the huge percentages of feeble-mindedness found by Binet-Simon surveys during the last few years among delinquents and adults will suffer collapse. The majority of subnormals are dull, backward and retarded rather than feeble-minded.

Diagnostic Mental Measurement: A Point Scale for Adolescents and Adults. R. M. Yerkes & C. Rossy, Psychopathic Hospital, Boston.

The pre-adolescent Point Scale devised at the Psychopathic Hospital, Boston, for the diagnostic measurement of intelligence in hospital patients has now been applied to upward of two thousand individuals, and the results have so far justified the expectations of those who are using it that it seems desirable to offer for use a scale, constructed on the same principles, for adolescents and adults. This, like the pre-adolescent scale, involves twenty tests primarily of the so-called higher or more complex mental processes, for each of which credit is given according to the merit of the reaction. The maximum credit for an examination is one hundred points, and the result of an examination is expressible as an index or coefficient of intelligence, which is obtained by dividing the score made by an individual by the expected score. The latter, in turn, is obtained by reference to norms for the scale based upon the examination of relatively large groups of individuals.

This new adolescent and adult scale is intended primarily for the ages from twelve onward to the limit of intellectual development, that is, approximately sixteen years. It is, therefore, as contrasted with the earlier scale, an adolescent and adult scale. Emphasis should be laid upon the fact that both scales are intended for the making of rough diagnostic measurements in order that individuals may be classified as (*a*) very inferior, (*b*) inferior, (*c*) normal or average, and (*d*) superior, in intelligence.

Methods of Studying Ideational Behavior in Man and Other Animals. R. M. Yerkes, Harvard University.

The writer's multiple-choice method of studying ideational and allied types of behavior in man and other animals has yielded valuable results as used with ring-doves, crows, rats, pigs, monkeys, and orang utans, children,—normal and defective, adults,—normal, defective, and insane. These results indicate that the method is well worth perfecting in order that comparisons may be made of the chief characteristics of some of the important learning processes in various types of organism.

The multiple-choice apparatus is now being designed in such wise as to render it serviceable, in three sizes, for a great variety of vertebrates; and in attempting to perfect and provisionally standardize the apparatus and mode of procedure, the writer has found it possible to so plan the apparatus that it shall be valuable, with minor changes, for experimentation by means of the Hamilton method of studying reactive tendencies, the Hunter delayed-reaction method, as well as the Yerkes multiple-choice method. Since these three methods give valuable information concerning the presence and functioning of ideas, it is a considerable gain to comparative psychology to have them available through a single apparatus.

Mental Tests of College Students, as Freshmen and as Seniors. K. T. Waugh, Beloit College.

Seven selected tests were given to 123 members of the freshman class at Beloit in the spring of 1912. The tests were again given to the same persons three years later with the purpose of ascertaining the mental functions that are most developed during the period spent in college. Tests were chosen which would measure functions most diverse and most representative of the subject's status of intelligence. These were: Concentration of attention, speed of learning, retention, quickness of association, ingenuity, range of information and motor control. The results of each of these tests were correlated with the results of all the others, and with the class standings of the freshman year.

The highest positive correlation was found between controlled association (opposites) and class standing. The highest negative correlation was found between motor control (steadiness) and class standing.

During the present year when the tests were applied again to seniors, some of the tests had to be discarded since there was a possibility of the tests in the freshman year influencing the result of the second test. This is true of the ingenuity test, and to a certain extent of the memory test. Many of those tested in 1912 had dropped out of college, and some in the senior class had entered since 1912. There were difficulties about securing the seniors for individual tests; but we present the results from 39 subjects who took both tests, together with the percentage of improvement and the norms found for the whole freshman class.

The latter part of the paper presents a scheme for reducing the results of several mental tests to a uniform basis, enabling the results of the several tests to be combined so as to yield an index of intelligence or mental efficiency. The scale of measurement is comparable with the marking system in vogue in the majority of colleges. A description is given of an angular scale and sliding rule by which measurements expressed in any scale may be quickly changed to corresponding points in the uniform scale.

The Distribution of One Hundred College Freshmen in Several Tests. K. Gordon, Bryn Mawr College.

A class of young women, college freshmen, whose average age is eighteen years, was put through the following tests: (1) Completion of Terman's "Strength of the Eagle"; (2) deferred memory, being a reproduction of "The Marble Statue" after a delay of forty minutes; (3) star tracing; (4) Hayes's rational process test box; (5) Woodworth's and Wells's substitution test; (6 and 7) Terman's problems No. 3 and 5 in "Genius and Stupidity"; (8) the puzzle of the fifteen matches used in Thompson's "Mental Traits of Sex"; (9, 10, 11) controlled association—a modified form of the Woodworth and Wells opposites, supraordinate and subordinate concepts; and (12) the criticism of a group of syllogisms. The nearest approach to a normal distribution curve was found in the tests for deferred memory, substitution, and supraordinate concepts. The three puzzles proved to be somewhat too difficult, the criticism of the syllogisms too easy. The meaning of the other curves is equivocal. Correlations are being computed between various pairs of tests.

Psychological Tests as Diagnostic of Certain Individual Differences in College Students. E. Murray, Wilson College.

This paper forms the preliminary report of an experimental investigation into individual differences; especially such as are of vocational importance. Among the problems attacked were: (1) The significance of certain tests as revealing specialized abilities, *e. g.*, in the handling of ideas, symbols, things or people; (2) the relation between the speed of various associative processes, and general or special ability, as shown in college courses or activities; (3) the correlation between learning tests of different types and mental and motor ability as shown in academic and gymnastic records; (4) certain peculiarities in free association responses, and their relation to temperamental or other differences. The principal tests utilized are those of the Woodworth-Wells series, the pencil maze, mirror drawing, the Fernald and other construction puzzles, the Knox cube imitation, and handwriting pairing tests.

Preliminary Work on the Construction of a Scale of Performance Tests. R. Pintner, Ohio State University.

The desirability of having a scale of performance tests in which the factor of language does not enter has led to work on the standardization of about 15 performance tests. The necessity of such a scale in the case of non-English speaking individuals, of deaf mutes and other children whose language is undeveloped, is obvious. It should also prove to be a valuable supplement to the present scales which depend mainly upon language responses. The tests have been collected from all available sources with the addition of some new tests. An accurate standardization of each test is being made in order to find the diagnostic value in each case, since it has been found that specific tests are suitable for certain ages. At the present time a standardization of the following tests has been completed: Feature Profile, Manikin, Five Figure Board, Two Figure Board, Casuist Form Board, Seguin Form Board, Adaptation Board, and Healy's Five Block Frame Test. Results for the other tests are being gathered.

The combination of this group into a scale cannot be made until the standardization of each individual test is completed. At present it would seem that the Binet system of groups of tests for each age is impracticable, since the number of different tests required would be too large. Very probably some method of scoring by points or the computing of the average of the mental ages for each test will prove to be more desirable in computing the ability of the individual.

A Scale for Measuring Ability in Arithmetic. D. Starch, University of Wisconsin.

The scale is designed to measure ability in arithmetical reasoning. It is composed of a series of twelve problems arranged in the order of steps of increasing difficulty. The value of each problem was determined experimentally by a test made upon over 2,000 pupils in grades four to eight in fourteen schools. The steps of the scale are numbered from four to fifteen. Each step contains one problem. The scale is to be used by allowing the pupils as much time as they need to do as many of the problems as they can. A given pupil's score is the highest step passed. For example, if a pupil does all steps up to and including eight and then fails on all the rest, his score is eight. But if he fails on nine, does ten and eleven, and fails from there on, his score will be ten. That is, he receives credit for every step passed beyond the point where he first failed.

A Comparison of the Binet-Simon Method of Measuring Intelligence with the Yerkes-Bridges Point Scale Method. J. W. Hayes, University of Chicago.

The comparison is based on the results obtained in the examination, by both the Binet and Yerkes methods, of two hundred New York school children, one hundred each of eight and nine years, of the same race and educational training, taken from a school in the Jewish district of the lower East Side. The children examined formed two age groups, selected only in so far as they represented the proportional distribution of these two ages throughout the different school grades, and included no children who had actually been reported for mental deficiency. The comparison is made, first, directly, between the results obtained from the examinations by the Binet and by the Yerkes methods; second, indirectly, by reference to the school grading of the children (first to sixth grades inclusive); and, third, indirectly, by reference to the results of twenty other tests given to the same children.

The Distribution of the Feeble-Minded arranged by Mental Age (Binet). S. C. Kohs, Chicago House of Correction.

This article is an attempt to visualize the distribution of mental deficiency tabulated by mental age and interpreted in the light of the Gaussian curve of normal frequency. The information on which the study is based was obtained from the published data of three institutions (1,000 cases), and from some few community surveys, with supplementations by the author.

The Standardization of Test Blanks. E. S. Jones, Cincinnati Bureau of Vocational Guidance.

The following are standardizations of certain familiar test blanks used in the laboratory of the Vocation Bureau of Cincinnati.

(*a*) An evaluation of the comparative difficulty of seven blanks for the "Opposites test" was made by giving to each of 159 children, 14 to 17 years of age in the upper grammar grades, two of the blanks successively. Ranking the blank beginning 'bad' as 1.00, the ratios of each of the other blanks in accuracy and index time divided by accuracy to it are as follows: 'Good,' .94 and .99; 'Asleep,' .87 and 1.10; 'Inside,' .77 and 1.45; 'Strong,' .80 and 1.75; 'Worst,' .72 and 1.98; 'Wise,' .59 and 2.53.

(*b*) The second standardization concerns the difference in the difficulty of cancelling given letters on the Whipple small-letter cancellation blanks furnished by Stoelting and Co.; and also the difference in cancelling the same letters on the two different printed forms. Two of the three letters, 'a,' 'm,' and 'w,' each on a different one of the two forms, were cancelled by 71 children, 15 to 17 years of age, and 53 adults. There were no striking differences between adults and children. The ratios in accuracy and index of each to the other letters are as follows: a to m, .93 and 1.26; a to w, 1.02 and 1.17; m to w, 1.13 and .77.

437 '*a*' cancellation records, 140 "m" records, and 189 "w" records show that there is no difference in the case of any of the three letters between the two forms so far as accuracy of cancellation is concerned. In the case of index, with the letter "*a*" there is a consistent indication of the greater difficulty of the "*hp*" over the "*zc*" form,—8.3 per cent. for 14-year-old boys, and 6.6 per cent. for 17-year-old boys who had had three previous annual tests. Both of these percents are about a third the respective mean variations. There is no significant difference in the "*m*" index (1 per cent.); while in the cancellation of *w*'s the "*zc*" form was 4 per cent. harder,—less than a fourth the mean variation.

Correlations of Mental Measurements, among themselves, and with School Grade, Physical Ability and Industrial Factors. E. S. JONES, Cincinnati Bureau of Vocational Guidance.

Intercorrelations were first determined for school grade, average mental ability, and each of 18 measurements of the tests used in the first of a series of five examinations given to working children of Cincinnati by the laboratory of the Vocation Bureau. The subjects were 100 boys 14 years of age, 50 of whom were below and 50 above the average of the total larger group of over 400. The Spearman foot-rule formula was used, and, for the purpose of comparing the difference in the relationship of functions between the low and the high subgroups, an $R(l)$ and $R(h)$ were calculated by summing the absolute values of the g's, without regard to sign, in each subgroup, and treating these sums separately as usual g-sums of the same sign where $n = 100$. Obviously the mean of $R(l)$ and $R(h)$ will in each case be the true foot-rule R for the entire 100.

Very few strikingly high correlations between test measurements were found. The only function showing consistent, though slight, negative correlations was the accuracy of a routine learning test, which gave 8 minus R's out of 17. The average of the mental tests correlated with school grade to the extent of $R = .33$. In general the $R(l)$'s were higher than the $R(h)$'s, indicating that there is better correlation between functions in the low than in the high group.

A second set of correlations was found between certain important mental-test groups and the following, the average of physical test measurements; job tenure; and average weekly earnings during the first two years of work. Most of the R's were small, almost negligible. Job tenure correlates highly with grade (.28), and none at all with physical ability (.002); while the wage rate shows the reverse relationship with both of these factors (.005 and .24 respectively). The average in mental tests correlates only slightly with job tenure and wage rate, $R = .11$ and .07 respectively; and the highest relationship between either industrial function and a test group is that of .11 for R between wage rate and immediate memory.

Our conclusion is, that under the present haphazard condition of finding jobs, general or specific mental measurements furnish but little basis on which to forecast either earning capacity or permanency of position during the first two years in industry.

A Constructive Ability Test. T. L. KELLEY, University of Texas.

A brief survey of intelligence tests not dependent upon language and little subject to preceding formal training is made. Form board and other constructive tests are mentioned as of this nature, but all fail to test one of the highest evidences of intelligence: the ability to propose adequate problems, ends, or purposes. The need for a test which (1) is free from dependence upon language, (2) is little affected by preceding formal training, (3) does test initiative as well as manipulative ability and (4) is capable of accurate grading and standardization, is pointed out.

The test, consisting of building blocks of such a nature as to offer slight possibility of transfer of training from ordinary building blocks and mechanical outfits, evolved to meet these conditions is then described. Other conditions, not quite so fundamental, are shown to have been met so that the test, as finally devised, may be given to children of a broad range of ages, requires a relatively small amount of time to give (thirty minutes for a fifteen-year-old child), and does not involve elaborate apparatus. The method of giving and grading the test is explained.

Several traits of character revealed by the test are enumerated, as are also the qualifications of the experimenter who is to realize the more subtle of these. The objective grading, based primarily upon a scale of merit which consists of forty stereoscopic photographs of structures of different degrees of complexity is illustrated. The scaling of these structures, which has been accomplished by the method used in the derivation of such scales as Thorndike's Handwriting Scale, is described. Also the use of the scale, its reliability, and the reliability of its use by an individual.

Two Spatial Relations Tests, and a Learning Test. L. L. THURSTONE & W. V. BINGHAM, Carnegie Institute of Technology.

The first "spatial relations" test is intended to give an indication of a subject's ability to think spatial relations involving three dimensions, and is proposed for use in preliminary tests of prospective students of drafting, machine design, architecture, pattern-making and other subjects which call for ability to interpret bi-dimensional drawings in tri-dimensional terms. The mental task set by the test is similar to that of Binet, test No. 2, fifteenth year. The test blank furnishes twenty-four of these spatial relations problems, approximately uniform in difficulty and calling for a negligible amount of motor response. The second test may be called a "spatial inference" test. The blank contains twenty-four syllogisms regarding spatial relations of approximately equal difficulty. The subject is required to check, as right or wrong, the conclusions of these syllogisms.

The "learning" test is a modification of Munn's familiar substitution test. It calls for the association of pairs of letters which are the initial and final letters of the key words, printed at the top of the blank.

PROCEEDINGS OF THE ELEVENTH ANNUAL MEETING OF THE SOUTHERN SOCIETY FOR PHILOSOPHY AND PSYCHOLOGY, COLUMBUS, OHIO.

Report of the Secretary, L. R. Geissler, University of Georgia.

The Southern Society for Philosophy and Psychology held its eleventh annual meeting at Columbus, Ohio, Thursday, December 30, 1915, in affiliation with the American Association for the Advancement of Science. The sessions were held in Page Hall of the Ohio State University. The morning session was held in conjunction with Section L of the A. A. A. S. In the evening the Society entertained at a smoker in Hotel Kaiserhof, to which the members of Section L were invited. The president's address, entitled, "Academic Progress of Psychology in the South," was given at this occasion and it was followed by informal discussions and reports.

The following items were passed upon at the business session held Thursday noon:

1. The place of holding the next meeting was left to the Council for decision. It was suggested, however, that the Society hold a single day session during Christmas week in some Atlantic coast state and then join the meetings of other scientific organizations in New York City. It was furthermore proposed that from 1917 on in alternate years the Society meet in conjunction with other southern organizations, such as the Southern Conference for Education and Industry.

2. The following Amendment to the Constitution was laid before the Society, to be voted on at the next annual meeting: Article I, Name and Object, to read as follows:

Sec. 1. The name of this organization shall be The Southern Society for Philosophy, Psychology, and Education.

Sec. 2. Its object shall be to promote the interests of Philosophy, Psychology, and Experimental Education, in the southern section of the United States by facilitating intercourse among those who are cultivating these subjects, and by encouraging original investigations among its members.

The purpose of the proposed change is to extend membership to all whose interest in philosophy or psychology is mainly due to their research activities in educational fields.

3. The following officers were elected: President, Dr. David Spence Hill, New Orleans, La.; Vice-President, Professor E. K. Strong, Jr., George Peabody College for Teachers, Nashville, Tenn.; Council for two years, Professor Patterson Wardlaw, University of South Carolina, Columbia, S. C.; Council for three years, Dean J. C. Barnes, Maryville College, Tenn., and Professor E. E. Rall, University of Tennessee, Knoxville, Tenn.

4. The following were elected to membership: Miss Buford Johnson, Johns Hopkins University; Dr. and Mrs. H. W. Odum, University of Georgia, Athens, Ga.; Dr. Walter B. Swift, Boston, Mass.; and Professor Goodrich C. White, Emory College, Oxford, Ga.

5. The accounts of the treasurer were audited by a committee of the Council and showed a balance on hand, December 30, 1915, of $90.18.

L. R. Geissler,
Secretary-Treasurer

University of Georgia,
Athens, Ga.

The following abstracts of papers were received:

Address of the President

Academic Progress of Psychology in the South.[1] J. C. Barnes, Maryville College, Tenn.

The purpose of this study was to show the academic progress of psychology in the South from 1905 to 1915. Two questionnaires, one of which pertained to the situation in 1905 and the other to that of 1915, were sent to each of sixty universities, colleges and normal schools of the South. Forty replies were received, and the catalogs of the institutions were studied.

The replies indicate that there were only two professorships of psychology in the South in 1905; and only two well equipped laboratories. A majority of the higher institutions of learning offered only three semester hours of psychology; a few of the larger universities gave an introductory course of six semester hours, followed by one or more advanced courses; only two universities were doing graduate work in psychology. One half of the institutions reported psychological libraries, four fifths of which contained fewer than one hundred volumes, and one fifth from one hundred to two hundred volumes. Two institutions reported psychology as a separate department. Three fourths of the institutions listed the courses in psychology under philosophy, and one fifth under education. Salaries varied from twelve hundred to twenty-five hundred dollars.

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[1] This address will appear in full in the *Psychological Review*.

The decade from 1905 to 1915 has been one of rapid progress in the academic status of psychology. Psychological libraries and laboratories are provided, but only a few of the institutions have separate professorships of psychology.

Seventy-five per cent. of the institutions offer a first course in psychology of three semester hours, twenty per cent. give a first course of six semester hours, one half of the institutions require the first course in psychology for graduation; one fourth require the first course for students in the department of education; one-fourth make psychology elective. Advanced courses are given in practically all of the institutions replying; the universities and normal schools give a large number of special courses. Approximately twenty per cent. of the sixty institutions are giving graduate courses in psychology. Nineteen laboratories were reported, ten of which have more than one room; eight laboratories report equipment valued at fifteen hundred dollars or more; two at six thousand dollars each. Ten institutions reported regular annual appropriations for the psychological laboratory from one hundred to one thousand dollars. With one exception the size of the laboratory classes ranges from six to ten. One fourth of the institutions report psychological libraries containing fewer than one hundred volumes, with an average between one and two hundred volumes. One half of the institutions take from one to ten psychological periodicals, two report over ten and two over twenty periodicals. Salaries vary from twelve hundred to three thousand dollars, the average salary being eighteen hundred dollars. One half of the institutions report research.

The progress of psychology in the South has been rapid during the past decade and the outlook for the future is very encouraging.

The Consciousness of Self in Recent Psychological Literature. L. R. Geissler, University of Georgia.

This paper presents mainly in review form the position of Th. Ziehen, with regard to the consciousness of self and his relation to recent discussions of that problem in the American psychological literature by such authors as Calkins, Curtis, Dunlap, Gamble, and Titchener. Ziehen's view is most closely related to Dunlap's view of the self as against his hypostatization of a transcendental ego. Ziehen defines the self merely as an individual collective concept characterized by four peculiarities, to which no separately existing entity corresponds. We have no more right to hypostatize these four characteristics into a separate existence than we have to assume the existence of a special national soul or of a mob-mind.

Ziehen compares his conception of the self to that of a river whose relatively constant bed indicates the relative constancy of the self-complex, and whose cross-section at any place would represent the momentary condition of this self-complex or soul. The term self or ego or I signifies the mere fact that the sensations and ideas of a human being form a collective system, in which they are characterized by special interconnections, just as the drops of water in a river are more closely interrelated than the individual rain-drops. Yet nobody would nowadays seriously try to hypostatize this greater closeness of relations into a separate existence.

The writer's own contribution to this controversy about the consciousness of self consists in the first place in pointing out that one form of this self is the reference to the whole group of mental processes occurring on the lowest level of attentional vividness. This group is usually said to be composed of mainly kinæsthetic and organic sensations, but at times it may also consist of highly complicated ideational processes. The reference is to the whole group of these background processes as such, not to individual processes in that group, whose lability is usually overlooked in the casual introspections of Calkins's "plain man." The four characteristics attributed by Calkins to the self may just as correctly be applied to this background as a whole. A further suggestion is that a detailed study of the ontogenetic development of the consciousness of self from earliest infancy promises to cast considerable light on this important problem and should antecede further controversial discussion.

When Is Knowledge Organized? W. C. Ruediger, George Washington University.

The factors involved in the thorough comprehension of a topic, and therefore in knowledge when organized, appear to be reducible to the following outline:

I. From the standpoint of the particular.
  1. Classification.
    (*a*) Logical.
    (*b*) Analogous—likeness and difference.
  2. Function.
    (*a*) Humanistic.
    (*b*) Natural—scientific.
  3. Description—static, giving sensory qualities.
  4. Description—genetic, tracing development.
II. From the standpoint of relations.
  1. Cause—reference to explanatory principle.
  2. Operation of cause.
    (*a*) Under different conditions—natural laws.
    (*b*) In concrete applications.
    (*c*) Giving rules and directions of control.
  3. Location in space.
  4. Location in time.

Each of these factors may be applied to the particular as a whole or to each of its parts, or to both in succession.

Scientific School Organization. C. S. Foss. (Reported by the Secretary.)

The author described in some detail with lantern illustrations the recently established scientific school organization in the School District of Reading, Pa., instituted with the help of the new Bureau of Research and Efficiency, according to the Courtis standards. This plan involves the following main topics: (1) Organization and government of school districts; (2) accounting, statistics and forms, their revision and amplification; (3) teaching, with special regard to simplification of records and reports, rating of teachers, and examinations; (4) pupils, their promotion and retardation and its causes; (5) instruction, with special regard to the courses of study, vocational schools, and continuation schools. The author pointed out how the introduction of a scientific organization into school systems increased their efficiency enormously.

Questionnaire Results on Terms in Psychology. K. Dunlap, Johns Hopkins University.

The Developmental Psychology of the Stutterer. W. B. Swift, Boston, Mass.

This paper presented the reasons for new treatment, the researches that indicate that a new treatment is necessary, and finally a short outline of that treatment.

The reason for initiating certain developmental psychological processes in the stutterer is based upon the recent finding that the visualization processes are at fault during speech. The sum and substance of this is that when a stutterer is in trouble he lacks a visual picture. This finding and the research that led to it were published in the *Journal of Abnormal Psychology*, October, 1915.

Another recent research covered the contents of consciousness outside of the limited field of visualization processes and showed that they consisted mostly of associative memory things that gave no hint of subconscious complexes or seemed to demand any such complex for their explanation.

The present paper shows that therefore the *treatment indicated* is to supply the visualization processes that are lacking. The accomplishment of this was done by efforts along the line of developmental psychology, and the reader succeeded in the development in the stutterer of certain processes of visualization.

Further Psychological Analysis of Stuttering. W. B. Swift, Boston, Mass.

A first paper revealed unsatisfactory subconscious data to explain stuttering. A second paper presented an analysis of the conscious side of stuttering and showed the constant factor of the absence of visualization process as the background and cause of stuttering. Hence the name visual center asthenia. This, the third paper, analyzes all the other conscious content of stuttering and finds a sequence of events, memory, fear, functional slump, stutter, residual proneness, as the contents. The analysis finds no need and no hint of a subconscious complex, confirms the second paper, and denies the Freudian concept.

Motion Models, Their Use in the Transference of Experience and the Presentation of Comparative Results in Educational Methods. F. B. Gilbreth, Providence, R. I. (Reported by the Secretary.)

The motion model, of which the author presented several samples, is a wire representation of the path of a motion. By means of many lantern illustrations the author showed how through the use of the chronocyclegraph method satisfactory records of a motion path may be obtained, which present in one picture the relative time, the exact absolute time, the relative speed, the exact absolute speed, and the direction of all motions in three dimensions.

The wire motion model is an exact copy of the chronocyclegraph record in permanent, three-dimensional form. It has many valuable advantages. It assists in visualizing the motion path, which can be viewed from many different angles, as the chronocyclegraph record cannot be viewed thus. This visualizing process is often sufficient as a stimulus to motion economy and to invention. It can better than anything else impress its user with the reality and value, especially the time and money value, of useful and useless motions. It helps in the analysis of complicated curves of motion paths. The expert can use the motion model to learn the existing motion path and to discover possible lines of improvement, both in the technique of performing the motion and in the machinery employed. To the beginner the motion model is a standard of what he is to do, how it is to be done, and how fast it is to be done. In addition to all these points, the motion model is of course a perfect and permanent record of the motion performed.

On the Psychology of Religious Myths. W. T. SHEPHERD, Waynesburg College.

The paper is a report of a brief study of typical myths of different primitive peoples, in numbers deemed sufficient to warrant inductions, as to the mental factors and forces involved in the genesis of such myths. The results obtained by a study of myths in general are applied to religious myths in particular. The Homeric, Hesiodic and other Greek myths are considered; the Scandinavian myths and the myths of other ancient and modern primitive peoples are likewise taken into account.

From a psychological analysis of myths such as above mentioned, the reader concluded: In the class of explanatory myths (1) the principal mental factors in their genesis have been primitive imagination or fancy and primitive credulity, and (2) the principal mental forces impelling to their genesis were curiosity and wonder; in the class of entertainment affording myths, (1) the chief mental factors have again been imagination and credulity, and (2) the impelling mental forces to the formation of the latter class of myths have been a universal desire in man for entertainment, and a purpose, conscious or unconscious, in poets and other myth makers to cater to such a desire.

A Survey of the Gary Schools and Pre-Vocational Schools in New York City. B. R. BUCKINGHAM, New York City.

The Effect of Humidity on Nervousness and on General Efficiency. L. Stecher, Commission on Ventilation, New York.

School Surveys. E. F. Buchner, Johns Hopkins University.

Hypnotic Analogies and the Interpretation of Dreams. V. Moore, Catholic University of America.

NOTES AND NEWS.

Professor Kate Gordon, of Bryn Mawr College, has been appointed assistant professor of psychology in the Carnegie Institute of Technology.

Dr. Thomas V. Moore, instructor in psychology in the Catholic University of America, has opened as an integral part of the psychological department of that University a psychiatric clinic, with special reference to the needs of backward children, at Providence Hospital, Washington, D. C.

The following items have been taken from the press:

Professor William Stern, of Breslau, has received a call from Hamburg.

Professor H. Gross, editor of the Archiv für Kriminal-Anthropologie und Kriminalistik, has died at Graz at the age of 67.

Oswald Külpe, professor at the University of Munich, has died at the age of 53, after a brief illness.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

THE LAST DECADE OF PSYCHOLOGY IN REVIEW[1]

BY CHRISTIAN A. RUCKMICH

University of Illinois

Several reasons prompted the author to undertake at this time a literary review of the decade which has just closed. It is exceedingly difficult to refrain from replying in some measure to the charges which in one way or another imply an incompetence on the part of psychology to take its place among the empirical sciences and to make contribution to the fund of knowledge in terms of its own special procedures. The criticisms have come from without and from within the discipline. Philosophers have recently informed us that "the present is a strange and troubled time for psychology"[2] and that the science is compelled "to revise its scale of values, shift its emphasis and direction of progress, and enter into relations of better understanding and coöperation with philosophy, or accept as its portion a distinct subject-matter and move in the direction of increased isolation from human affairs and the remaining body of scientific knowledge."[3] Nor does reproach cease here: from the philosophers we must hear reports of desertions in our own ranks. Says one critic: "To those who have grown suspicious of the definitions and methods commonly employed in psychology it is a most hopeful sign that this suspicion has gained active and vigorous support among psychologists themselves."[4] Thus, in the conviction of one of our number, psychology "has failed signally . . . during the fifty-odd years of its existence as an experimental discipline to make its place in the world as an undisputed natural science."[5]

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[1] In abbreviated form this paper was read before the American Psychological Association, Chicago, December 28, 1915.

[2] JONES, A. H., "The Method of Psychology," *J. of Phil., Psychol.,* &c., 1915, 12, 462.

[3] BODE, B. H., "The Method of Introspection," *J. of Phil., Psychol.,* &c., 1913, 10, 91.

With indictments like these against us, we can fortunately turn with confidence to certain events which must be taken into account when the history of the current decade is written. To anyone who has read with care the reports of the Committee on the Academic Status of Psychology, further reference to this aspect of the subject need hardly be made.[6] In the decade which we are considering, the laboratories of psychology have almost doubled their number. Ten years ago psychology was recognized as a separate department in only four academic institutions; now we have distinct departments in more than thirty-five institutions of this rank. Reports indicate an unusual degree of progress during the year 1915 as regards academic recognition of psychology as an independent science. The following items taken at random from the press suggest more than normal growth:

> "The new University of Frankfurt has grouped psychology with the natural sciences in the faculty of science. A recent action by the University of Missouri goes in the same direction. Students who have done no biological work in high school and who therefore have to take in the first or second college year five hours of biological science may fulfill this requirement by taking five hours of psychology. To this extent the University of Missouri recognizes psychology as a biological science." Psychol. Bull., 1915, 12, 243-4; see also p. 127. "The University of Oregon has recently completed a new psychological laboratory." P. 128. "[At Dartmouth] a separate building is to be made available for the departments of psychology and education, and there will be ample quarters for psychological teaching and research."

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[4] Bode, B. H., "Psychology and Behavior," *Psychol. Rev.*, 1914, **21**, 46.

[5] Watson, J. B., "Psychology as the Behaviorist Views It," *Psychol. Rev.*, 1913, **20**, 163.

[6] Published by the *Amer. Psychol. Assn.*, December, 1914 and 1915. A word ought to be said about one of the conclusions which the author published in an article on the "History and Status of Psychology in the United States," *Amer. J. of Psychol.*, 1912, **23**, 517-531. It was stated that "psychology, after twenty-five years of growth, does not stand very high on the honor roll among other academic subjects." The observation does not require withdrawal; it was based upon statistical facts which represented comparative academic recognition in terms of financial support, student registration, and instruction. The first report of the Committee referred to agrees with the statement in several details (see pages 4, 15, 18). The items considered in the article relate only to certain limited phases of growth; a general development of the science is not denied.

P. 243. "The former combined department of philosophy, psychology, and education in the Johns Hopkins University has been divided into three independent departments."[7] P. 243. "George Peabody College for Teachers has received $8,500 . . . for equipping the Jesup Psychology Laboratory. This amount of money is to be spent for furniture, laboratory equipment, and psychological publications." *Science*, 1915, 42, 186. "The department of psychology of Reed College, Portland, Oregon, plans extensive improvements in its laboratory." PSYCHOL. BULL., 1915, 12, 403. "At Vineland, N. J., a new laboratory of 30 rooms is now occupied by the department of psychological research." P. 403.

A further indication of the rank of psychology among the sciences is given by statistics recently tabulated in regard to the number of doctorate degrees conferred in various subjects for the decade. These figures place psychology fifth in order. For the entire decade they are: chemistry 580, physics 242, zoölogy 226, botany 214, psychology 201.[8]

In many of the adverse criticisms, moreover, as has already been indicated in several replies,[9] either an historical background or a sympathetic understanding that comes from a knowledge of the traditional and periodical development of the science is almost, if not entirely, lacking. We need now and then to call a Spencerian halt in our progress and with a self-critical attitude to look back over the path which we have trod with the intention of discovering how far and in what direction we have travelled. It is for this reason that we miss the annual reviews of the general field which have appeared up to the last few years in the BULLETIN; and it is mainly on this account that the present review was undertaken. No complete survey of an extended period is to be found in our literature since the inventory made by Titchener in 1909 at the Clark University celebration. The review covered the preceding decade and succeeded by five years a similar historical summary made by the same authority at the St. Louis International Congress.[10] One point which, if we read the history of the times aright, seems to find a parallel across the gap of the decade is to the effect that adverse criticism may often go hand in hand with scientific progress and prosperity. This appears to have been as true in the year of the St. Louis International Congress as it is today. In his summary of the year's literary productivity, Buchner claimed that "this period is chiefly marked by a sudden and widespread reëxamination of the aims, methods, and fundamental conceptions of psychology. It has taken on the form of a social reaction to the earlier teachings of the science."[11] Contrasting with this statement is the one made by Angell in his discussion of the congress: "Taken in their entirety, these papers give the psychologist a flattering sense of the massiveness and dignity of the science which he espouses. So much of solid achievement to stand upon, so wide a territory already laid under contribution—surely these things augur a rapid advance and the speedy realization of those dreams of conquest which fifty years ago seemed the chimerical creatures of overweening ambition."[12] It may be that the two quotations are complementary, that they express two aspects of the situation and indicate that the story is fully told only when adverse criticism is accompanied by a constructive evaluation of actual achievement. To answer the accusations of our critics on purely theoretical grounds would be an endless and thankless undertaking—endless, because beyond each statement quoted lies a whole context of theoretical propositions which have to be met; thankless, because the accuser seldom takes the pains to think himself into the system which he is so laboriously attacking. But we can point to the productivity of the science as an index of its stability and growth, for, to quote a contemporary writer, "that the science is established beyond all peradventure may be gathered from the striking steadiness of its literary output."[13] This paper, then, makes the attempt first of all to answer the question, "*What* has been done in the last decade?"

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[7] About a decade ago the reviewer of the year's work heralded "the installation of the new department of philosophy and psychology with a promising laboratory complement at the Johns Hopkins University" as "turning its face to the future." E. F. BUCHNER, PSYCHOL. BULL., 1905, 2, 98.

[8] Computed from statistics arranged by *Science*, 1915, 42, 557.

[9] "At a time when psychology is taking her place as an independent empirical science among her sister sciences such a treatment [of psychology in its historical development] will, perhaps, help to obviate certain misunderstandings, such as are illustrated in profusion in the attempt of a brilliant contemporary writer to prove that psychology is quite without prospects." O. Klemm, *A History of Psychology* (trans. by Wilm and Pintner), 1914, p. 10. E. B. Titchener remarks: "I call the articles unhistorical because they give no hint that any similar revolt against an established psychology had taken place earlier in psychological history," On "Psychology as the Behaviorist Views It," *Proc. Am. Philos. Soc.*, 1914, 53, p. 4, see also p. 8.

Our second consideration has to do with method; to the question just put we add another: "*Whereby* has this been done?" In reply we have to search for the methods by means of which the work of the decade was accomplished. Naturally most of the critical discussion in which psychology is at present involved centers about the methods of the science: viz., introspection *vs*. behavior. In answer to the query: "Is psychology evaporating?" one psychologist replies: "If psychology is to maintain its place among the sciences, it must not isolate itself from the rest of natural process by limiting its interest to pure introspection or to purely objective behavior";[14] another suggests a "relative paucity of introspective studies";[15] a third views psychology as "a purely objective, experimental branch of natural science which needs introspection as little as do the sciences of chemistry and physics";[16] and a fourth is certain that "there is, as a matter of fact, not the slightest evidence for the reality of 'introspection' as the observation of 'consciousness.'"[17] Again it is not our present business to argue the matter out on theoretical principles; we prefer to let the literary product of the science speak for itself and, incidentally, for the science as well. It has been our purpose, therefore, to discover, if possible, to what extent psychology has relied upon the method of introspection as a means whereby scientific knowledge is sought. These two questions, the *what* and the *whereby* of achievement, stand as the underlying problems of the paper.

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[10] Titchener, E. B., "The Past Decade in Experimental Psychology," *Amer. J. of Psychol.*, 1910, 21, 404–421; "The Problems of Experimental Psychology," 1905, 16, 208–224.

[11] Buchner, E. F., Psychol. Bull., 1905, 2, 90.

[12] Angell, J. R., "Psychology and the St. Louis Congress," *J. of Philos., Psychol., &c.*, 1905, 2, 546.

[13] Buchner, E. F., Psychol. Bull., 1912, 9, 5.

The method followed in reviewing the decade is not new; it has been profitably used in the surveys above mentioned. Owing to the complicating factor of the present war, however, only American psychological periodicals were analyzed. The review covers the six general periodicals: the *Amer. J. of Psychol.*, the *Psychol. Rev.*, the Psychol. Bull., the *Psychol. Monog.*, the *Arch. of Psychol.*, and the *J. of Phil., Psychol., &c* ; the psychological numbers of the *California Studies* were also included. Every original theoretical or experimental contribution which appeared from 1905 to 1915 inclusive—a year was added to the decade to bring together the material from the last corresponding review to date—was counted, analyzed, and classified according to the current rubrics of the *Psychol. Index*. The statistical tables upon which our general review rests show, therefore, the number of articles written, the number of pages covered by each article, and the kind of method which was used in the investigation of which the article is the report. These items are classified under the 75 headings and subheadings found in the *Index*.[18] Over 800 articles covering more than 20,000 pages in the journals were thus analyzed and arranged.

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[14] Marshall, J. R., *J. of Phil., Psychol., &c.*, 1913, 10, 710.

[15] Calkins, M. W., "The Self in Scientific Psychology," *Amer. J. of Psychol.*, 1915, 26, 524.

[16] Watson, J. B., *Behavior, an Introduction to Comparative Psychology*, 1914, p. 27.

[17] Dunlap, K., "The Case Against Introspection," *Psychol. Rev.*, 1912, 19, 412.

A word in explanation and defense: the author naturally realizes that statistical methods may be abused. Figures require interpretation and interpretation is elastic. Although the results were computed as accurately as possible, care was taken not to emphasize or overestimate comparatively small differences. The same may be said in regard to the classification of methods: to avoid ambiguity it was decided that the introspective method was used whenever an author referred to his results as introspections or whenever he actually quoted introspective analyses. The review of the decade falls, then, into the classification of the *Index* and follows in the order of the headings specified.

I. General.—In the way of general papers discussing problems, methods, apparatus, technique, and the like, we find a large number of contributions; more papers—about one fourth of the total number of papers for the entire decade—appeared in this field than in any other. The closest competitor is the field of *sensation* and *perception* with the greatest number of pages covered. Arranged in order of number of articles written and in order of the number of pages used, the years 1912, 1905, and 1908 stand at or near the top of both lists, while 1911 and 1915 stand at the other end. This agrees in general with the comments of the reviewer of the years indicated.[19] Naturally the most frequently discussed topic within the group is that of general problems in which the subject of *consciousness* plays an especially prominent rôle in 1905, 1908, and 1913.[20] On this subject three articles, or one fifth of the maximal number, with an average length of about eleven pages are accredited to each of the years 1909, 1910, and 1915. Significant for the science is the fact that the next highest number of articles written within the group appear under the heading of *general apparatus and technique*. Some importance must also be attached to the disappearance since 1913 of purely speculative and philosophical articles from the strictly psychological journals.[21] These articles were particularly abundant at the beginning of the decade. The fact that psychological periodicals have not printed more than one purely physiological article in the human field in the decade seems also to point to the conclusion that psychological material has preëmpted the space.

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[18] In this classification the substance and not the title of the article guided the author in his judgment of its appropriate place, *e. g.*, Dodge, R., "A Working Hypothesis for Inner Psychophysics, *Psychol. Rev.*, 1911, 18, 167–185, was classified under I.5 (Mind and Body) and not under III.7 (Psychophysics). In several instances the author took issue on these grounds with the classification which the *Index* had given to the articles considered.

[19] We have already noted the comment on the year 1905. Concerning 1912 we read, "The particular interests of the year have been in the nature of critical reactions toward some of the work of former years. These have been most marked in the attacks on introspection as a psychological method, the critical testing of tests, and the more secure establishment of the field of applied psychology." Buchner, E. F., Psychol. Bull., 1913, 10, 3. But this state of affairs is interpreted as "a sign of growth."

[20] The reviewer of the year notes that "the term 'consciousness' seems to face the dangers which years ago routed the term 'soul' and 'mind' from our vocabulary." Buchner, E. F., Psychol. Bull., 1912, 9, 1.

III. SENSATION AND PERCEPTION.—Exceptional activity has been displayed in this field: this is especially true of the years 1908 and 1909. About one fifth of the entire number of papers written fall in this group within which *vision* easily dominates with its complement of one fourth of the total number of papers written in the group. Direct and indirect vision is the most consistently attacked problem. Next in importance is the auditory group in which field sound-localization plays a leading rôle. Remarkable it is that in these eleven years not a single paper on taste and smell has appeared in the general periodicals. The dearth of material on organic sensation complained of by Titchener a decade ago[22] is partially repaired by the publication of five articles in this period: two in 1908 and three in 1915. Over 200 pages in ten articles written for the most part since 1909 is the answer to Titchener's indication of a revival of psychophysics at the close of the previous decade.[23] Work done under the main heading of this paragraph requires unusual patience and application. If a general impression gained by the reviewer be allowed, the investigations carried on in this field have for the most part engaged the attention of specialists in the several branches: persons are carrying on this form of research with a zeal and a persistence less frequently found in other directions. We venture to say that most well-read psychologists can call up more names of investigators connected with the several topics listed under this caption than with any of the others. It is a rapidly growing field and one which has become unusually attractive during the last few years.

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[21] The *Psychol. Index* had already given notice in its 1911 number that "philosophical works are noted only if they contain matter of psychological interest."

[22] TITCHENER, E. B., "The Problems of Experimental Psychology," *Amer. J. of Psychol.*, 1905, **16**, 211.

[23] *Op. cit.*, 212.

IV. Feeling and Emotion.—These subjects have made considerable progress since Titchener noted the scarcity of studies in the field a decade ago.[24] One twentieth of the total number of articles written in the decennium are classified under the general rubric; of these more than half were concerned with the affective processes. Many of the studies were made at the beginning of the period, but a gradual increase toward the end indicates a possible crest in a wave of interest just approaching. May we hope for a series of well-planned studies which will supply us with much needed facts in a comparatively neglected field.

V. Motor Phenomena and Volition.—With greater emphasis on the behavioristic tendencies in the psychophysical organism, a relatively large increase in the number of papers concerned with the motor aspects of experience was frankly expected. Curiously, then, *action* is credited with but a little less than one tenth of the total number of pages and papers; what is still more noteworthy is that the highest frequency in the curve is observed at the middle of the decade with a marked decline at the end. The totals in this field equal almost to a digit those which appear under the rubric of *attitudes and intellectual activities.* The year 1909 was the most productive of all and showed interest in both introspective and in non-introspective procedures and in theoretical discussions. The greatest number of studies were concerned with experiments on the reaction and motor consciousness; the problems related to work and fatigue claimed almost as much attention.

VI. Attention, Memory, and Thought.—The total number of contributions closely approximates the corresponding figure under *sensation and perception;* studies of memory compare favorably in number with the work done in *motor phenomena and volition* (*q. v.*). Investigations in the entire field, with the exception of a slight relapse in 1911, have steadily increased in number since the beginning of the decennium. Especially is this true of investigations of the memorial consciousness. In 1915 an unusual amount of interest was also aroused in problems connected with the recognitive consciousness and with the imaginative functions. The studies of attention, however, hardly come up to the expectations aroused at the beginning of the decade. Thirteen papers, or approximately one tenth of the total of the group, are concerned with thought, and a somewhat greater number of papers and pages deal with the examination of judgment, belief, and reasoning. *Comparison*, *abstraction*, *ideation*, the *psychology of testimony*, the *diagnosis of mental situation*, *disorders of attention*, *memory*, *and thought* stand at the bottom of the list under this rubric with very few or no contributions during the decade.[25]

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[24] *Op. cit.*, 213.

VII. Attitudes and Intellectual Activities.—Reference has already been made to the rubric. About one third of the total number of articles in the group are concerned with the psychology of language and most of the work was done in 1914. The psychology of religion was extensively discussed at the beginning of the decade, but during the latter half, probably due to increased outlet in the special journals established during the period, not a single article has appeared. Naturally the same may be said in general about educational and animal psychology.

VIII–XII. In the discussion of special mental conditions like sleeping, dreaming, and the study of the effects of ether and other drugs on consciousness, the year 1910 showed the greatest activity. All told, however, these papers number only about one twentieth of the grand total. Nervous and mental disorders and animal psychology receive even less attention in the general periodicals, while the psychology of individual, racial, and social phenomena, and of genetic development were slightly more productive. For reasons just mentioned a considerable decline is also indicated in these fields for the last few years. Consequently a complete review ought not to pass over the fact that several special journals which were founded during the decade, or near its beginning, offer additional avenues for the escape of scientific thought in their specialized fields. The *Journal of Educational Psychology*, started in 1910 and devoting about 400 pages annually to original contribution, and the *Journal of Animal Behavior* together with the *Monograph Series* furnishing yearly since 1911 approximately 550 pages of material in their separate fields, are typical examples; other similar publications include the *Journal of Religious Psychology*, the *Psychological Clinic*, and the *Journal of Abnormal Psychology*.[26] In addition to the periodicals just mentioned we must not forget that some of the more important general journals are virtually products of the decade. A list of these should include the *Psychological Bulletin* (1904), the *Journal of Philosophy, Psychology, and Scientific Methods* (1904), and the *Archives of Psychology* (1906); special series not yet mentioned are the *Journal of Race Development* (1910) and the *Psychoanalytic Review* (1913).[27] Here surely is evidence of a healthy growth of periodical publication in this country; there is promise of continued increase in the announced—probably, at the time of the publication of this review, the accomplished—appearance of the new *Journal of Experimental Psychology.*

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[25] The aberrations of conscious phenomena as a class do not seem to have aroused the interest of the investigators who publish their contributions in the general periodicals. In addition to the topics mentioned, the *disorders of sensation and perception*, the *disorders of feeling*, and the *disorders of movement and instinct* have been, as far as publication in our journals of psychology is concerned, absolutely barren fields during the decade.

[26] By agreement most of the psychological periodicals now publish a complete list of all these journals, together with the general facts concerning their publication and subscription, on the last page of the last cover.

Before summarising the facts so far reviewed, we now turn to that phase of our work which attempts to answer the query: "*Whereby* has all this been done?" Here we have to do with method. All of the articles which appeared in the decade were grouped into four classes: introspective-experimental, introspective-*non*experimental, *non*introspective-experimental, and *non*introspective-*non*experimental. The first two classes contained articles in which the introspective approach was mainly emphasized, *i. e.*, introspections were taken in the investigation, referred to in the results, or specified in the procedure; the first class differs from the second in that the former involved and the latter lacked experimental control of conditions. The third class of articles depended for their results principally upon *non*introspective procedure and material, *i. e.*, they contained records of work done for the most part by means of methods which have come to be designated as behavioristic. The fourth group comprised theoretical, speculative, and general articles. Naturally in limiting cases there was some difficulty in differentiating the groups as given, but practically most of the papers fell easily into one or another category: doubtful cases were credited with half value in each of the two classes to which they doubtfully belonged. Measured in terms of frequency of use, the outcome of the analysis readily established the importance of introspective methods in the way of experimental contribution as compared with the "behavioristic" procedures. Of course in certain special fields, as one rightly would expect, *non*introspective work of an experimental type predominates; but even in some of these, the balance is not decisive. Motor phenomena and volition; the special mental conditions brought about by sleep, drugs, and suggestion; nervous and mental disorders; individual, racial, and social phenomena; mental development in man, including educational psychology; organic evolution, including animal psychology: all of these were investigated with comparatively little reference to introspective procedures. They naturally do not lend themselves to such treatment. The first two topics, moreover, do not give definite returns in our calculation: reckoned in terms of pages covered, introspection shows more frequent use than *non*introspective experimentation. In almost all of the topics discussed there is, of course, much theoretical writing: the subjects treated under the first general heading are almost entirely of this character.

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[27] Many of these journals show by count that the pages devoted to original contribution have slightly increased in number from year to year.

In order, therefore, to make what was considered a fair comparison of the various approaches to the subject of psychology, we drew up a table of ratios calculated approximately from the computed totals as found in connection with those sections which seemed to comprise the main business of general experimental psychology. The sections so selected include headings three to eight, viz., the subjects: sensation and perception, feeling, emotion, volition and motor phenomena, attention, memory, thought, the attitudes and intellectual activities, and special mental phenomena. This, in our mind, delimits the scope of normal, human, adult psychology. In this general field, then, we find that in point of number the introspective studies head the list of investigations in the decade with 234 separate articles; theoretical studies follow with 150; and the *non*introspective experimental papers foot the list with 93. In other words, there are roughly two and a half times as many introspective as nonintrospective experimental papers. The ratios run through the years as follows:

RATIOS SHOWING FREQUENCY OF USE
(Behavioristic methods = 1)

In Terms of Number of Articles			Year	In Terms of Number of Pages		
Experimental-Introspective	Nonexperimental-Introspective	Speculative-Theoretical		Experimental-Introspective	Nonexperimental-Introspective	Speculative-Theoretical
1.3	.3	.77	1905	2.1	.25	1.2
1.5	.55	2.	1906	1.	.26	.6
2.	.9	2.5	1907	2.25	.4	1.08
3.75	.5	5.	1908	12.	.45	3.6
3.	.55	3.7	1909	5.1	.3	1.6
2.5	.37	1.9	1910	6.	.09	2.8
2.3	.37	1.	1911	3.	.25	.8
2.25	..	.8	1912	3.	..	.4
3.	.25	1.1	1913	2.8	.02	.9
1.15	.07	1.25	1914	2.15	.05	.9
2.05	.16	.8	1915	7.	.05	1.16
2.25	.36	1.9	Averages	4.21	.19	1.3

These figures indicate in general a gradual rise in the use of the introspective procedures from the beginning of the decade, with a slump in 1914 and a definite recovery from the critical attacks in 1913–1914 under which introspection apparently suffered.

In conclusion and in answer to our original question, "*Wkat* has been done in psychology during the last decade?" we can point to the work outlined and accomplished in the way of contributions to our general periodicals in the field of sensation and perception, to the progress in the investigation of feeling, and to the increased activity, especially in the last few years, in the study of memory and of recognition. Surely, too, there is in general an increasing productivity in the field of journal publication. Other events of the times, the increase in laboratory facilities, the position which psychology has taken academically among the other sciences, and the gradual emancipation from its parent disciplines, we have mentioned in our opening paragraphs. With all this positive statement, it would not be fair to avoid reference to the decline of researches concerned with the thought consciousness and with the attentive consciousness; it is not unlikely that snags have been struck which must be removed before the initial task may be completed. In the meantime we are getting the benefit of these lateral borings.

The net result of our inquiry into methods employed in the decade in answer to the question, "*Whereby* has all this work been done?" is clear and definite. In terms of the sanction of methods through extensiveness of usage, our study reveals the fact that introspection has contributed more generously to normal, human, adult psychology during the past decade than has any other method. In both phases of our problem, it is extremely difficult, if not impossible, to find a single decadent tendency.

SENSATION—GENERAL

BY MADISON BENTLEY

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In reply to criticisms of Rahn,[1] Titchener (4) dwells upon the distinction to be drawn between "the sensation of classification and the sensation of observation." Under immediate observation some attribute or attributes will be focal, others, as a rule, marginal. Rarely are all the attributes observable at one and the same time. The sensation of classification, on the other hand, includes all the attributes which appear at various times and under various determinations but with unchanged excitation; it is the "logical resultant of many observations." This author further defines the sensation of observation by distinguishing it from awareness and other forms of meaning, and also from genetic derivations of consciousness. If sensation is to be regarded existentially and if its problems are to be set apart from the problems of perception, then it is important that the ancient confusion of sensation with perception and of stimulus with object of perception—a confusion discoverable in Titchener and in many other current writers—should be cleared up. In his discussion of the stroboscopic integration of movement, Linke (1) warns his critics—though not effectively—against this confusion. In its crudest form, the confusion appears in Russell's article upon "Sensation and Imagination" (3). Russell's "sensation" is the traditional British "sense," akin to "perception" of current analytical psychology. A propos of the identification of sensation with awareness, it appears to be this logical substitute for the systematic sensation that Herrick (2) means when he argues, upon neurological grounds, against the existence of "static elements." He thinks it unlikely that "simple sensations" exist, because the cortex is exposed in its functions to subcortical entanglements. "The essentials of cortical process seem to consist, not in putting raw sense data into relation with each other, but in integrating complex physiological functions which are already under way and directing them by inhibition, reinforcement, or otherwise in the light of the previous experience of the individual." It may be questioned whether neurological theory can profitably be used at present to discredit observation. The distinction between stimulus and determination might conceivably have enabled Herrick to retain his doctrine of cortical functions without rejecting the results of psychological research.

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[1] See BULLETIN, 1915, 12, 100.

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VISION—GENERAL PHENOMENA

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Ewald Hering's familiar contention that in the Purkinje phenomenon, the colors blue and green grow relatively brighter by only as much as they become whiter, and that the phenomenon is wholly due to increased dark-adaptation is in complete agreement with the duplex theory of vision so far as extra foveal parts of the retina are concerned. Now in the *Festschrift für H. Sattler* (15) Hering emphasizes once more his further contention that the rod-free fovea is also appreciably dark-adaptable and exhibits the Purkinje phenomenon (although not so strongly as do extra-foveal portions), by describing a not too complicated apparatus for demonstrating this phenomenon in foveal vision. With a small circle of which half is red and half blue, the Purkinje phenomenon can be produced so strongly that "for a few seconds" the blue half almost extinguishes the red by "simultaneous contrast." The phenomenon is transitory because the fovea loses its dark-adaptation more rapidly than other parts of the retina: this transitoriness is comparable to the rapid fading of the *Aderfigur*, etc. If this on the fovea is the same Purkinje phenomenon that is ordinarily gotten on the peripheral retina, the fact would not seem to be immediately in harmony with the duplex theory. It would be interesting to know whether the red used in Hering's observation can be replaced by orange and yellow. Hering describes a very simple means of showing that unless the eye is dark-adapted the P. phenomenon can not be gotten even in peripheral vision. Schaefer (22) points out that according to the duplex theory, a white spot foveally viewed but too feebly illuminated to stimulate the cones would not be seen as black, but would be seen not at all; in other words, the fovea in twilight vision would figure as does the blind-spot in daylight vision. Just this his experiments show to be the fact. Furthermore, if in twilight vision the field immediately surrounding the fovea is uniformly (but of course feebly) stimulated, the foveal gap appears like the rest of the field; *i. e.*, it is "filled in" as is the blind-spot in daylight vision.

Blachowski (4) has continued his work on *Binnenkontrast*, this time with the *dark-adapted* eye. A momentarily illuminated disc (on fovea or periphery) is seen to light up from its edge towards its center, and to fade away in the same direction. The disc appears to have at its center a dark region, which is sometimes surrounded by one or more dark rings. This dark central portion becomes larger if the whole disc is made larger, but becomes smaller and less distinct as the brief illumination of the disc is lengthened, or as the intensity of illumination is increased. The author argues that in dark-adaptation (as he has previously shown for light-adaptation) adjacent retinal elements (whether rods or cones) show a mutual inhibition of stimulation (*Binnenkontrast*). Certain phenomena, under dark-adaptation, seem to show that prior to the inhibition a mutual summation takes place, as found by Exner (*Bahnung*) and for rod-vision by Piper; and for threshold stimuli the author admits that perhaps summation is the only *perceptible* phenomenon. The argument is acute but perhaps less convincing than in the author's previous paper on *Binnenkontrast* under light-adaptation; it is helped out by recourse to "very complicated" central factors (attention, etc.). Lohmann (19) finds binocular summation of threshold stimuli if he works from above the threshold downwards, but not if he starts below the threshold and works up. He proposes a distinction between summation of stimuli and summation of sensations.

Miles (20) studies after-images as projected on backgrounds of different intensities, and with intermittent exposure of such backgrounds. A faded after-image can be "revived by stimulation of neighboring areas, in the absence of direct stimulation of the initially excited retinal areas. This indicates the possibility of a 'spread' of impulses from the rest of the retina and in particular from those paths bordering those originally stimulated." Under some circumstances (fatigue ?) the paths previously excited by a stimulus seem to be blocked to the passage of subsequent impulses. "The blocking effect seems to be confined to the actual paths that have been previously opened through the synapses. Such a block or increase of resistance would be produced by a retraction of the cell processes and, though it is improbable that this movement will ever be seen actually taking place, there is abundant indirect evidence in support of the possibility of such action." This theory is argued for at length. "The recurrent image, which appears on momentary stimulation of the retina, appears to be due to the intermittent passage of impulses through the synapses such as might be brought about by rhythmical approximation of [cell] processes under the influence of continued retinal activity." The observed reduction of intensity on prolonged fixation of a light is attributed to retraction of cell processes. Positive and negative after-images are accounted for, respectively, by openness of the image path with high resistance of the surrounding tracts and vice versa. The colors of projected after-images are studied, but (as always heretofore) the results cannot be simply formulated.

In regard to color-theory Dunlap (7) points out (what is often lost sight of) that Helmholtz's choice of red, green, and blue for primary colors was hardly more than accidental. Dunlap conceives that "the acceptance of green and red as primaries prevents a realistic interpretation of the phenomena of color vision, since a really *red* object is (probably) seen as *yellow* by the dichromopsic individual, whereas red is not compounded from yellow, but yellow from red, according to the theory." Dunlap proposes, as primaries, yellow, peacock and mauve. One wonders how far realism is in question, here, for the author adds, "So far as we can assume psychologically, some person or animal might see as blue, or as any other color, or even as the note b♭, the object I see as red." Edridge-Green (9) gives observations from which he concludes "that there is no evidence supporting the view of the composite character of the yellow sensation when produced by pure yellow spectral light."

Day (5) has worked on the action currents of the eyes *in situ* of live pike, by means of the Einthoven galvanometer and with white light. The four variations observed by Piper are confirmed; these are, when the illumination is turned *on*, (*A*) a preliminary negative deflection (latent period of .032 sec.), (*B*) a positive deflection (latent period of .075 sec.), (*C*) in thoroughly dark-adapted eyes a second and much slower positive deflection; and when the illumination is turned *off*, (*D*) a positive deflection (latent period of .049 sec.). From similar experiments Einthoven and Jolly, and Piper inferred the presence of three "visual substances." The author argues that Einthoven and Jolly's substances I, II, and III correspond to Piper's substances II, I, and III respectively.

Zipkin (26) continues the work of Gildemeister and Rutenburg[1] on the effect of light interruptions,—for areas larger than the fovea. The results of Gildemeister and Rutenburg are confirmed. After about two minutes of darkness the fovea comes to a constant state of adaptation relative to the perception of light-pauses; the periphery continues for 10 or 15 minutes to increase in sensitiveness to light-pauses (as it increases for constant light). This is not true, however, if the light (interrupted or constant) is red. The length of the threshold pause decreases as the light-intensity increases. But the product (intensity × duration of threshold pause), *i. e.*, the threshold light-subtraction, increases as the light-intensity increases. There seems to be no summation effect for light-pauses which succeed one another at intervals of .7 sec. or at longer intervals. Dunlap (8) finds that the determination of the shortest perceptible time-interval between two flashes of light is made almost impossible by the fact that the first flash is often seen as two successive flashes.[1] This doubleness is less noticeable with light- than with dark-adaptation. The threshold light-interruption appears to increase with increased duration of the first flash. For certain light-adaptations, at least, the threshold for light-pause is lower in the light-adapted than in the dark-adapted eye: this *seems* to disagree with the findings of Gildemeister, Rutenberg, and Zipkin.

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[1] Cf. PSYCHOL. BULL., 1915, p. 105.

Hunter (16) believes that the *retinal* factor (as distinguished from eye-muscle, associative, etc., factors) which helps to give the illusory after-image of motion, is "a *streaming phenomenon* which moves through external space in a direction opposite to that [previously] taken by the stimulus." This streaming phenomenon "may be lymph currents, as Ferree supposes," or it "may be an electrical phenomenon." It is apparently identical with that described by the late A. H. Pierce as "a thin cloud of fine white dust moving across the field of vision" in a direction opposite to the previously watched objective motion. (Baley (2) should note that Pierce was many years before "Rollet" in describing this phenomenon.) Hunter is disposed to reject wholly the "fading after-image" theory for after-illusions of motion; but it does not appear certain, from the text, that he would exclude this factor in connection with the apparent motion of Purkinje's "ghost" and kindred phenomena, which are in a rather different class from those that he is considering.

Gates (13) tries to ascertain whether the difference limens for visual quality (whiteness-blackness) and for visual intensity are alike or different. The two instructions yield significantly different D L's but the "intensity" judgments seem to be "judgments of insistence or *Eindringlichkeit* and not of intensity proper." "We think it possible that some of the extant determinations of the D L for 'brightness' are measures of this insistence rather than of intensity or quality. Whether it is possible by more rigorous instruction, inducing a conscious abstraction from other attributes, to secure a true intensive D L of light sensation remains an open question." Smith (**23**) enquires whether there are "certain color-qualities which make a special appeal to attention." He finds "no predisposition for any one hue, common to all observers"; but believes that further experiments might yield a more satisfactory answer. Baley (**2**) describes several interesting color changes obtaining by half-closing the eyelids." Many familiar optical illusions (such as Fechner's colors, Pierce's dust-drift, Preyer's pattern) can be intensified in this way. "Half-closing the eyelids" is a procedure that seems little susceptible of any exact control. "McDougall has described the effects of novelty and *intensity*," writes Hartridge (**14**), "in the processes of antagonism and also the effects of the preponderance of contours on the attention process. To these effects will be given the name 'interest' in this paper." Then (five lines below) he proceeds "to show that 'interest' is able largely to *supersede intensity* as a factor in binocular antagonism, place," etc. (three words italicized by the reviewer). The entire article provokes this same kind of "interest."

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[1] Cf. Miles, **20**, II, p. 108.

Ferree and Rand (**11**) compare the flicker method and the direct comparison method, for getting heterochromatic brightness equations, to the advantage of the latter method. They believe the flicker method to be unreliable because the stimulations from different wave-lengths rise to their maxima (for any intensity used) at very different rates; so that during the brief flicker exposures the more rapidly rising colors have an undue advantage over those for which the sensation rises more slowly (an effect that is somewhat comparable to the Purkinje phenomenon). The summation due to the rapid repetition of the colored stimulus only partly corrects this error. The tables presented seem to rule out the possible counter-argument that although the *sensation* for some colors arises more slowly, yet the effective *stimulation* may still be secured by one color as quickly as by another; and yet possibly this point would bear further consideration. At the present time, too, there is uncertainty as to how far, in this matter of lag, the color and brightness components of a sensation behave identically (cf. p. 123, note); color-fusion, for instance, results at slower frequencies than brightness-fusion. And if brightness were found to be always one and the same physiological process, with whatsoever color combined, the objection to the flicker method for equating brightnesses would probably disappear. But this has not so far been found. The point is well taken by Ferree and Rand, that according to the Talbot-Plateau law the colors compared under the flicker method *cannot* reach that full intensity for which the equation (established by the comparision) is going to be asserted as holding. The flicker method, they find, yields an underestimation of the brightness of red and yellow, and an overestimation for blue and green. Although this method is more sensitive, it is true, it is less reliable than the "equality of brightness" method (direct heterochromatic comparison). The circumstance that the flicker method cannot be applied to photographic photometry unless the ratio of open to closed sectors, etc., are exactly adjusted in accordance with rather complicated mathematical formulas, as has been demonstrated by Weber (25), strongly confirms the opinion of Ferree and Rand.

Bender (3), on the other hand, calls the direct heterochromatic judgments of brightness "*sehr unsicher.*" The flicker and the Langley visual acuity methods are found to give "identical" results save that the flicker method is far more sensitive ("*genau*"), and yields smoother curves. Bender finds flicker equations to be practically constant from day to day, and except for violet light (where the fluorescence of the eye interferes) almost equally accurate for all pairs of colors. It is only fair to state that this is the work of a physicist; and that physicists very often ride over the subtler points of physiology and psychology with a naïveté that is only to be matched by the way in which, all too often, the psychologist essays to use the finer instruments of the physicist. In the opinion of the reviewer, Bender's findings by no means overthrow those of Ferree and Rand just cited. In a paper (17) that was not accessible to the reviewer Ives and Brady describe a new "flicker photometer for laboratory colored light photometry." The design is highly praised in several places.

In questions of illumination Ferree (10) finds that there are three respects in which the efficiency of the eye needs to be tested: (1) brightness discrimination, (2) color discrimination, (3) visual acuity. Threshold judgments are recommended for 1 and 2. For 3, test figures are recommended which are simple (Snellen's series contain so many characters that a variable error of fatigue is introduced) and which test vision rather than apperception (which enters in too largely where ordinary letters and numerals are used). No visual acuity test-card if merely momentarily exposed, will give a reliable measure of the state of efficiency of the eye, since even when tired the accommodation mechanism can rise, in response to a momentary demand, to practically its normal state. The safer way is to let the acuity-card be fixated for, say, three minutes, during which it will be seen with fluctuating distinctness. The ratio of the total time during which it is clearly seen to the total time during which it is unclearly seen, is a good test of the actual state of acuity. Loss of efficiency, under poor illumination, is very largely due to fatigue in the muscular control of the refraction mechanism. Where direct illuminating systems are used, the brilliant light sources (incandescent-lamp bulbs, etc.) seen on the periphery of the retina tend to draw the fixation away from the far less brilliant objects on which the attention is centered, and towards themselves; and they tend similarly to make the eyes accommodate for the distance at which they are away, and this is often very different from that of the object attended to. As a result, spastic contractions of the accommodation muscles are set up which are both disagreeable and very fatiguing; the fixation muscles also are fatigued. There seem to be three main sources of visual discomfort: (1) the "blinding" sensation caused by a sudden increase in brightness of the object looked at; (2) the sensation of "sand" on the conjunctiva, which can become stinging and painful; (3) pain in the eyeball (and even in the forehead and temples), probably due to fatigue of the accommodation muscles. In (**12**) Ferree and Rand print a résumé of results obtained on the problem of lighting. "In some of the respects most important to the eye, this [the indirect] and the semi-indirect systems with a small direct component of light give the best approximation of the distribution effects characteristic of daylight of any that have yet been devised." But the component of direct light is apt to be made too large. Fatigue due to injudicious lighting is "muscular and not retinal." Generally too much light is provided, yet "when the proper [uniform] distribution effects are obtained, intensities high enough to give the maximum discrimination of detail may be employed without causing appreciable damage or discomfort to the eye." Eye-shades are not a good substitute for lamp-shades, but if the eye-shade is to be used it should be opaque with a light-colored lining. "The observation of motion pictures for two or more hours causes the eye to lose heavily in efficiency," yet little if at all more than it loses "by an equal period of working under much of the artificial lighting now in use." Loss of visual efficiency is rather closely correlated with visual discomfort. Paterson (**21**) believes that when sewing and other work is to be done on fabrics of a uniform color, where one must depend "for the discrimination of the detailed strands of the fabric on the small shadows cast by one strand on to the next and on the varying brightness over the curved surfaces of each individual strand," then "there is nothing so good as a unidirectional light giving harsh shadows for the discrimination of detail." The author approves of indirect lighting in all other situations. Some remarks are added about invisibility of troops, the visibility of light-houses, etc.

Troland (24) describes the theory and practice of the artificial pupil, an indispensable piece of apparatus of which the reviewer has hitherto seen no careful account. The model designed by the author, and here described, is binocular and provides rapid and accurate means for securing concentric registration between the artificial and the natural pupils. From the theoretical discussion it appears that no artificial pupil can be used where the stimulus object subtends an angle of more than about 53°. Dunlap (6) describes an interesting new device, the "duoscope," for testing visual acuity. It seems to be "not sensitive to brightness changes over a considerable range"; but it is sensitive to adaptation changes, and may be found useful as an adaptometer. It is specially adapted for detecting slight degrees of astigmatism.

Abderhalden and Wildermuth (1) describe the photoelectric potassium cell as an objective recorder of brightness differences. Light alters the resistance of the selenium cell, but sets up an electromotive force in the potassium cell. The authors find that the potassium cell will record brightness differences which are absolutely invisible to the eye. It is subject to the Weber-Fechner law, but this is no practical drawback. For colorimetry it has a (color) range both above and below that of the eye. The technique of the potassium cell is at present rather tedious and exacting, but the authors believe that many of the difficulties can be overcome. Johnson (18) offers a valuable method for obtaining several monochromatic stimuli with the aid of light filters. The ordinary spectrometer system will give only very little light of any one color, while most light filters give much more light, but it is far from being monochromatic. If the mercury vapor arc is used, its four very bright and narrow bands (violet, blue, green, and yellow) can be individually isolated by the use of filters, which are here described. A practically pure red can be had by using a certain ruby glass. It is perhaps worth noting, however, that not all mercury vapor lamps can be held at constant intensity.

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VISION—COLOR DEFECTS

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The question of color-tests is still engaging the attention of a number of Europeans of wide experience in this line. Edridge-Green (2) writes that, although the tests introduced by the English Board of Trade in 1913 have resulted in a larger proportion of rejections than ever before (an advance from less than 2 per cent. to nearly 5 per cent., the inadequacy of the present tests is clearly shown by the fact that in 1913 among 286 rejected, 93 appealed and 26 of these were accepted. In Germany where the Nagel *Tafeln* are widely used as a preliminary test, there is great difference of opinion as to whether this test alone can be depended upon to detect all dangerous cases. Horniker (4) recommends the use of the Stilling and Nagel tests together; Augstein (1) recommends the use of the Stilling and Cohn *Tafeln*, laying great stress upon the latter. Rosmanit (8) makes the main contribution of the year in a volume which should be on the desk of every investigator in this line. He gives first a careful review of the spectral work upon color defectives, then a detailed description of the Nagel anomaloscope, directions and hints for the practical diagnosis of color defects by means of the anomaloscope, and a summary of the conditions under which subjects should be judged eligible for service where color decisions must be made. He recommends the use of the Stilling and Nagel *Tafeln* as preliminary tests, to be followed by a test with the anomaloscope in all doubtful cases.

The lower degrees of color defect are now receiving an amount of attention which promises well for the ultimate classification of these puzzling cases. Parsons (7) gives a brief historical review of the investigation of anomalous trichromatic vision, in his book on *Colour Vision*—a book which is by far the most complete and scholarly treatment of the facts and theories of color vision which has ever been published in English; Rosmanit (8) gives a much more detailed treatment, showing the results obtained in testing 440 anomalous trichromates with the Nagel anomaloscope, and with the Nagel and Stilling *Tafeln*. After an interesting review of the discussion concerning the relation of this group to those who show color-weakness in the various ways outlined by Guttmann,[1] Rosmanit classifies color defectives that are not dichromates into three groups—(*a*) typical anomalous trichromates who demand an abnormal amount of red or green in the spectral equation red + green = yellow (commonly called the Rayleigh equation), and *also* show decided color-weakness; (*b*) pure spectral anomalous trichromates who demand an abnormal spectral equation but do not show color-weakness; and (*c*) color-weak trichromates who accept the normal spectral equation. The great majority belong to class (*a*). Rosmanit considers individuals of classes (*a*) and (*c*) too defective for positions on railroads or steamships, while those of class (*b*) might safely be accepted.

Köllner (5) reports the results of an attempt to classify anomalous trichromates quantitatively, by the use of the Nagel anomaloscope. It is generally known that normal persons accept an equation of red + green = yellow which is practically the same for all, that anomalous trichromates do not accept the normal equation, but insist either upon more red or more green, while dichromates accept the normal equation and wide variations from it in both directions. Köllner finds that among the anomalous trichromates he has studied, some insist upon a very definite mixture of red and green while others accept variations either toward the red or the green, which gives a result similar to that of some dichromates. These results are graphically presented, by the use of charts, and clearly demonstrate his conclusion that a considerable number of anomalous trichromates can be arranged in series, one group passing from the deuteranomalous trichromates with a very restricted Rayleigh equation, through those accepting more and more of red or green, to deuteranopes; the other group passing from protanomalous trichromates with a very restricted Rayleigh equation through transition forms to protanopes. Between normal and anomalous trichromates Köllner finds no indisputable transition forms, but suggests that one might consider as such, a third type which his researches have discovered—subjects which at first seem to have a restricted normal Rayleigh equation, but who fatigue so quickly to color that they soon accept great variations from the normal, in some cases approximating the wide range of mixtures characteristic of dichromates. Köllner, like Rosmanit, finds color weakness quite common among anomalous trichromates, though he also reports that among his subjects those who accept the widest variations in the Rayleigh equation often show the least evidence of color-weakness. These cases remind one of Rosmanit's pure spectral cases.

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[1] Guttmann, A., "Untersuchungen über Farbenschwäche," *Zsch. f. Sinnesphysiol.*, 1908, 42, II, 24–64, 250–270; 43, II, 146–162, 199–223, 255–298.

Watson (9) reports the results of testing anomalous trichromates with white light passed through 0.8 cm. of saturated solution of chromate of potash. His cases fall into classes somewhat resembling those found by Köllner. It is to be hoped that the author will later publish his results with the Rayleigh equation that a comparison with the work of Köllner, Rosmanit and their predecessors may be facilitated.

Hegner (3) reports upon a student with a color defect limited to the left eye. After tests with the Nagel and Stilling *Tafeln* and the Nagel anomaloscope, Hegner diagnoses the defect as extreme protanomalous trichromasy; and since the subject's testimony showed that, at an earlier date, he had had difficulty in distinguishing colors with the right eye while using the microscope, Hegner raises the interesting question whether this subject may not have been born with a *functional* defect in the color apparatus which has been corrected in one eye by use, as occasionally occurs in patients with congenital amblyopia. Hegner proposes to test this hypothesis by systematic education of the subject's defective left eye. Hegner further reports that among 50 men tested he found 3 dichromates, 2 monocular anomalous trichromates—one a typical case, the other a purely spectral case without any evidence of color-weakness—and a number of subjects with slight color deficiency.

Usher (6) publishes three pedigrees of color-blindness upon which work had been begun by the late E. Nettleship. The first pedigree is of theoretical importance since it includes 3 color-blind women and a 4th with some slight color defect. In none of these cases has color-blindness been proved to come through both parents as one would expect, but as there is not sufficient data it cannot, on the other hand, be asserted that the inheritance has come through only one parent. In two instances the fathers of the color-blind women were color-blind, while in a third instance the mother belonged to a stock containing color-blindness. Usher's second pedigree contains 7 color-blind men, one of whom is a twin. Here the inheritance seems according to rule in every case. Usher's third pedigree is an extension of one published by Pliny Earle in 1845. This is now the largest pedigree of color-blindness on record, including 443 individuals distributed through 8 generations.

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TASTE AND SMELL

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Careful experiments in taste reaction time are reported by Chinaglia (1). His purpose was to determine the effect of temperature change in the rapid solutions upon sensitiveness to the various tastes. He began his work by verifying the fact, discovered by Kiesow, that raising or lowering the temperature of the solution between the points where the heat and cold become painful has no effect upon the intensive stimulus limen. A simple appliance which he used in these experiments is well worth noting. It consisted of a U-formed glass tube with one long arm. The hook of the tube, which contained a definite quantity of liquid, could be kept almost immersed in the warm or cold solution even during the moment when the subject was drawing the liquid into his mouth. From this work Chinaglia proceeded to measure the reaction time to taste solutions of various temperatures. The subjects knew in every case the nature of the taste to which they were to react. The temperature of none of the solutions was such as in itself to produce pain. Chinaglia's findings in regard to the result of raising the temperature of the solution above that of the mouth or lowering it beyond this point are as follows: In the case of salt, change of temperature has no effect on reaction time. Lowering the temperature lengthens the time of reaction to the other three tastes. Raising the temperature shortens the time for sweet but lengthens it for bitter and, in a very marked degree, for sour. Chinaglia traces this peculiarity of the reaction to sour to an increase in the bite of the acid, an increase which obscures the taste quality and delays recognition. In conclusion, he stresses the fact that an effect of high and low temperatures upon sensibility to taste is clearly demonstrable in terms of reaction time though not in terms of the stimulus threshold.

Henning (**2**) appears to be in process of making the most important contribution to the psychology of smell which has appeared in recent years. But only the first installment of his work is as yet in print, and, in the absence of adequate experimental detail and numerical data, it is impossible to estimate the soundness of his conclusions. His attitude toward earlier work (with which he shows an extensive acquaintance) is minutely critical and, in the main, destructive. He begins his paper with an introduction upon the crying need for a classification of smells upon truly psychological principles. Next comes a section (Section 1) dealing at length with his own subjects, some of whom were experts in smell discrimination; dealing briefly with the 415 scents which constituted his experimental material; and dealing far too briefly with his olfactometric procedure. His instruments included three forms of olfactometer but practically no details are given in regard to the applicances and concentrations used, or in regard to the number or time-order of stimuli given at a sitting in any particular set of experiments. Section 2 deals "with dirhinic, dichorhinic, and monorhinic smelling," that is, with smelling in which the same stimulus is applied to both nostrils, in which different stimuli are applied to different nostrils, and in which a single stimulus is applied to a single nostril. In his insistence on the inadequate perception of quality obtained by monorhinic smelling, he makes a point of great importance. He rightly urges that if monorhinic smelling is unsatisfactory, dichorinic smelling cannot be a satisfactory way of obtaining mixture of smells. He believes, moreover, that the necessity for "procedure with knowledge" in olfactometric work is entailed simply by the customary practice of presenting the stimulus to one nostril at a time. Section 3 discusses the sensations of warmth, cold, pressure, pungency and taste which may blend with the true sensations of smell and points out the situations in which they are localized. Section 4 is the portion of the work valued most highly by the reviewer. Here Henning points out the illusions which may arise when the subject knows beforehand the exact nature of the stimulus which is presented to him. A sharp distinction is to be drawn between the true smell quality (*Gegenheitsgeruch*), which is perceived by a subject smelling with closed eyes and ignorant of the nature of the stimulus, and the object-smell (*Gegenstandsgeruch*), which is perceived when the subject knows just what he is getting. The former is ordinarily localized within the nose; the latter is projected, like a color, upon an extra-bodily object and is likely to be distorted by memory and expectation. Of this distortion Henning gives excellent illustrations.

Sections 6 and 7 deal with Henning's own experiments in smell similarity. Details of experimental procedure are extremely meager. Unanimity between the subjects was his test of correctness of judgment. Sections 5 and 8 treat respectively of smell terminology and of other classifications than Henning's own. In the opinion of the reviewer, his unflattering appraisal of the method by which Zwaardemaker has remodelled the classification of Linnæus is not entirely fair. Section 9 gives the details of Henning's own classification and develops his conception of a smell-prism which shall present the interrelation of odors as the color pyramid symbolizes the interrelation of colors. The angles and edges of this prism are all equal. At the six angles should stand the best representatives (not yet determined) of Henning's six classes of smells —spicy, flowery, fruity, resinous, putrid, and empyreumatic or scorched (*brenzlich*). This classification is based upon his experiments in smell similarity and upon other experiments, very briefly described in this section, in which subjects were given a number of scents and were required to arrange the similar ones in a series and to throw out the others. The following odors are typical of the six classes: nutmeg, violet, lemon, frankincense, sulphuretted hydrogen, and tar. The exact assignment of the several classes to the several prism-angles is immaterial, since there is a gradual transition from every class into every other class. The edges of the prism should be thought of as occupied by intermediate smells and the classes which stand diagonally opposite to one another upon the rectangular faces must be connected with one another by diagonal lines across the several faces. The following are instances of transition-smells: between spicy and flowery, thyme and vanilla; between flowery and fruity, geranium; between fruity and resinous, the piney odors; between resinous and putrid, fish-scales; between putrid and empyreumatic, various ammoniacal animal fetors; between empyreumatic and spicy, roasted coffee; between putrid and spicy, garlic; between spicy and fruity, peppermint. The whole outer surface of the pyramid is supposed to be occupied by simple smells; its inside is reserved for mixtures. (By a mixed smell, Henning evidently means a smell derived from a physical mixture of odorous substances.) Although the smells at the corners of the prism are related to one another like the colors at the angles of the pyramid, yet the smells upon a given line are interrelated like the tones in the tonal scale and not like the colors upon an edge of the pyramid. For if two colors belonging to the same scale are mixed, the result will be an intermediate in this same scale, whereas if two smells in a series are mixed, the result, according to Henning, will be a chord-like blend. (There is an obvious geometrical difficulty in placing anywhere within the prism a mixture of two smells standing on the same edge or face, but no figure can do entire justice to the complex relations either of colors or of smells.)

Henning promises to present certain facts of chemistry in corroborations of his classification of smells. In the meantime, his prism will gain the attention of every one who is interested either in such constructions or in the psychology of smell. But its very neatness is against it and it will not win general acceptance until its maker brings forward a more formal and formidable array of experimental data.

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CUTANEOUS AND KINÆSTHETIC SENSES

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Work on the cutaneous sensibility of skin areas supplied by regenerating nerves is continued by Hacker (8). He renders anæsthetic an area of about 15 sq. cm. on the volar surface of his left forearm by the injection of a solution of iodine. The anæsthesia of this area is due not to the spread of the solution, but to the injury by the solution of the nerve which supplies it. The anæsthesia persisted for about two months after the injection, and then regeneration phenomena began to appear. The area was carefully tested for the various kinds of cutaneous sensibility during the period of regeneration. After 14 weeks the area was found to have regained its normal number of sensitive points except for the pain points, and it took two weeks more for these entirely to reappear. Throughout the whole course of the investigation the sense points, as they regained their sensibility, always appeared with normal thresholds. The author compares his results with those of Head,[1] and of Trotter and Davies,[2] and he finds several points of disagreement. In both the investigations cited an intermediate zone was found between the affected area and the normal skin, a zone in which the threshold of the sense points was higher the nearer the affected area was approached. This zone Hacker does not find. He does find that the sense points on the edge of the affected area are fewer in number than in the normal skin, but with careful investigation these points are all found to have perfectly normal thresholds. Trotter and Davies reported that during the period of regeneration certain sensations aroused in the affected area were peculiarly intense (intensification), and also that during this period a stimulus to the affected area tended to be localized on its edge (peripheral reference). Hacker finds neither intensification nor peripheral reference during the period of regeneration, though he does get results which correspond to each of these phenomena just outside the border of the affected area before regeneration has begun.

If a weight be placed upon the skin it arouses at first a clear sensation which then becomes less and less clear. The temporal course of this fading out is made the subject of an investigation by

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[1] Rivers, W. & Head, H., "A Human Experiment in Nerve Division," *Brain*, 1908, 31, 323–450.

[2] Reported in this Bulletin, 1914, 11, 153.

v. Frey and Goldmann (7). The arrangement of the experiment provides for the giving of two stimuli, a continuous stimulus lasting four seconds, during which time the sensation it arouses fades, and a momentary stimulus given at a certain varying length of time after the beginning of the continuous stimulus. If the sensations from the two stimuli are equal in intensity at the time the momentary stimulus taps in, then the intensity of the momentary stimulus represents the point reached by the sensation from the continuous stimulus in its process of fading out. The area of the continuous stimulus is varied, as is also its strength. The fading out of the sensation is found to be very rapid at first, but progressively less so. At the end of four seconds the continuous stimulus is giving a sensation only one eighth as intense as at the start. The sensation fades more slowly with increase in the strength or in the area of the continuous stimulus. v. Frey (6) also makes a study of the feeling of vibration, using tuning-forks of from 60 to 100 vibrations per second to arouse the sensations. He feels justified in concluding from his results that the sense-organs which mediate the feeling of vibration are the pressure receptors in the skin. When the tuning-fork is placed in contact with a bone the feeling of vibration is increased in intensity. This is explained by the fact that the bone, while it dulls the impulses very little, makes possible their wide spread over broad skin surfaces, and in this way a greater number of pressure receptors are brought into play.

Dimmick (4) investigates the localization of warmth sensations, using as a stimulus radiant heat from a loop of platinum wire electrically heated. This stimulus was devised to secure a means of arousing sensations of warmth without accompanying sensations of pressure. The error of localization is found to be very large as compared with that of a control series of pressure experiments. In the case of warmth sensations there are revealed very noticeable tendencies of direction in localization. The tendency is always inward from the edges of the area investigated.

A study of pain sensations on different parts of the body is made by Becher (1). He accepts the distinction between sharp, superficial and dull, deeper-lying pain qualities. His present purpose is to determine empirically whether pain sensations of the former kind are all of the same quality or if different qualities can be distinguished. With various kinds of pointed stimuli the whole surface of the body is explored, the author himself acting for the most part as the only subject. The pain sensations aroused by stimulation of the ordinary white skin, whether covered with hair or not, are found to be everywhere the same in quality. There are, however, parts of the body which give sensations that are recognized as of different quality. This is especially true of the inside of the auditory canal. Another study of cutaneous pain is made by Carati (3). He studied the affected skin areas in a number of cases of organic lesions of peripheral nerves to determine the pain sensitivity of these areas to the faradic current. The areas were explored with a needle electrode, and they were also carefully gone over with pressure and temperature stimuli for purposes of comparison. It is found that the areas affected in one way or another for faradic pain sensibility are always more extended than the areas of similar change for pressure and temperature sensibility.

Martin, Paul, and Welles (9) compare the threshold of faradic stimulation of the eye-wink reflex with the sensory threshold for faradic stimuli to the same spot on the lower eyelid. The sensory threshold is found with both the subjects used to be markedly lower than the reflex threshold. The sensory threshold is also much less constant than the reflex threshold.

Two studies have appeared on the central conduction of impulses originating in the cutaneous sense organs. Spiller (12), on the basis of a long period of observation of clinical cases, gives a summary of his conclusions on the central representation of cutaneous sensations. Brouwer (2) also concerns himself chiefly with the central conduction of cutaneous impulses. He relates his discussion to the segmental theory, and compares the distribution of nerves to corresponding skin areas in different species. Two studies have appeared which describe disturbances of cutaneous sensation due to injuries to the central nervous system, the patients being wounded soldiers. Rothmann (11) reports a case of injury to the spinal cord in the thoracic region as a result of which the patient's right leg has become perfectly insensitive to thermal stimuli, other forms of cutaneous sensibility remaining normal in the affected area, and the remainder of the body reacting normally to all forms of cutaneous stimulation. Redlich (10) reports observations on five cases of cerebral hemianæsthesia. He finds that the skin of half the trunk and head has become insensitive to all forms of cutaneous stimulation. The border-line of the affected area is almost the exact median line of the body. Two or more zones can usually be found on the affected side bordering on the middle line in which sensibility is not entirely gone. In these zones the sensibility shades off, growing less with greater distance from the middle line.

v. Frey (5) continues his valuable work on the muscle sense with some more experiments on the comparison of weights. It is well known that tossing a weight in the hand is preferred as a method of judging it to simply lifting it. The author experiments with both of these methods. In the lifting experiments he makes use of the leather-covered plaster cast of his previous experiments.[3] He calculates the difference-sensitivity for the muscle sense in two different ways. First there is the practical difference-sensitivity which is expressed in terms of the weights and their difference. Then there is also the true difference-sensitivity, expressed in terms of the amounts of muscle strain required to raise the weights. The latter is a physiological constant and is the more significant value for physiology and psychology. The results obtained in the experiments in which the weights were tossed show that this method of judging them is more accurate than the lifting method. Apparatus is devised to analyze the tossing movement, and it is found that here, as in the lifting experiments, the judgment of the weights is made on the basis of the muscle strain involved. The chief reason for the superiority of the tossing method the author finds in the short time that the muscles are in play. Fatigue is less, the subject has rhythmical repetitions of the stimulus, and the sensations to be compared are brought closer together in time.

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SPECIAL REVIEWS

The Circulation and Sleep. J. F. Shepard. New York; Macmillan, 1914. Pp. 83, with atlas of 63 plates.

This painstaking study of sleep and correlated physiological phenomena is the most ambitious work attempted since the well-known studies of Mosso published in 1881. The experiments covered two school years and were performed chiefly upon two subjects, the trephining of whose skulls allowed of direct study of brain pulsations by means of brain plethysmographs. Special apparatus was designed for each subject and conditions so adjusted that accidental factors were either eliminated, controlled or compensated for. Careful introspective reports were tabulated with the kymograph records, and the author is guarded in his generalizations.

Studies were made of the brain volume, of the peripheral circulation, and of the breathing curve, with the subject sleeping in various positions: upright, on his back, side, and so on. Further tests of blood pressure, heart rate, pulse-transmission time, the jugular pulse, the pulse-form, and the influence of certain drugs upon the circulation, are also recorded, the last only briefly.

A separate *atlas* of sixty-three plates accompanies the volume, and the book itself is devoted chiefly to an interpretation and explanation of these charts. The author presupposes a rather technical knowledge of the literature of his topic which will make the investigation effortful reading to any but the student of allied problems versed in its terminology.

Shepard finds the volume of the brain always increased at the inception of sleep, with an accompanying increase of the arterial pulse. Subliminal stimuli and the processes of awakening bring a fall of brain volume. So far as investigated, the physiological effect of dreams was ambiguous. Blood-pressure is lowered during sleep, disturbances of any sort causing a rise. The transmission of the pulse wave is slower in sleep, although the study of the venous system yielded negative results.

Of more general interest in his conclusion that there is an active, effective vaso-motor control of the brain vessels in man, under normal conditions, and that similar control is exercised over the respiratory wave, contrary to the usual assumption. The author rejects the anæmic theory of sleep (sleep as due to the separation of dendrites and axones by expansion of the cerebral vessels, for instance), first, because there are large increases in brain volume with stimuli while awake; in the second place because it appears demonstrable that circulatory changes so far as recorded in his charts, always lag behind mental processes involved (compare figs. 40 and 41 in the atlas). He therefore regards the relaxation of the brain vessels with sleep (and their constriction with awakening) as an effect rather than as a cause of the sleep process.

As to the psychology of sleep, suggestion and quieting environment effect a usual, but not indispensable, precondition of sleep. The content of sleep is described as a "group of sensations of fatigue or rest" —this from introspective reports—and sleep is therefore characterized as a "more complete rest" in which these sensations assume increasing dominance in attention and so, ultimate control.

The book and its atlas in binding and general appearance are a distinct contribution to monograph studies. The work was done at the University of Michigan, is copyrighted by them, and forms Volume I of the Scientific Series, University of Michigan Studies.

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The Criminal Imbecile. H. H. GODDARD. New York: Macmillan, 1915. Pp. 157.

The following chapter titles appear in this little book: The Case of Jean Gianini, The Case of Roland Pennington, The Case of Fred Tronson, The Criminal Imbecile, Responsibility, The Punishment for Criminal Imbeciles. Following these chapters are three appendices: (*a*) The hypothetical question propounded by the defense in the Gianini Case; (*b*) the hypothetical question propounded by the prosecution in the same case; (*c*) defendant's request to judge in the same case.

Dr. Goddard is using the word "imbecile" in this book in the legal sense. It includes the moron and often the idiot as scientifically classified. The cases which he describes here are the first court cases in which the Binet-Simon tests have been admitted as evidence. By means of these tests the mental age of the persons on trial was determined. These chapters are clearly written. This, together with the nature of the matter presented, should make them useful to those members of the legal profession who earnestly seek for a better understanding of the cases that come before them from time to time.

In the chapter on "Responsibility" Dr. Goddard discusses his cases in the light of the legal criterion of responsibility. To be responsible one must know the nature and the quality of one's act. Dr. Goddard begins this chapter with this sentence: "All students of the psychology of childhood agree that not until the dawn of adolescence does reasoning, as such, begin to show itself in the child mind; the judgment and foresight and self-control, such as enable a person to counteract his natural impulses and make himself fit into the conventions of society, are practically unknown previous to this age." This statement seems to the reviewer to be saying a good deal for the psychologists. The reviewer believes that a statement to the following effect would not be far from the truth: "No competent student of psychology believes that the normal preadolescent is lacking in those processes that are essential to reasoning; every normal child, before he has reached the adolescent stage has acquired many inhibitions such as counteract or tend to counteract his natural impulses and make him fit into the conventions of society." Psychologists certainly have got past the point of blocking off human development into definitely market segments; nobody believes that here or there is the definite cross-section on the one side of which reasoning begins. As soon as one begins to analyze one's experiences and to compare these experiences with others and to make statements based upon such comparisons, one has begun to reason. It looks as if the author of the book under review may have made himself believe the substance of the first sentence in this chapter on responsibility in order that he might show deductively that children under twelve are in no measure responsible in the legal sense and consequently that adults whose mental age is under twelve are likewise not responsible in the legal sense. Indeed this inference as to adults is stated in the next to the last sentence in the chapter.

In the same chapter, the author makes the statement that persons of the mentality of one under twelve do not know much about right and wrong; they act upon impulse and upon instinct without very much thought. Certainly we say that no one of us knows much about right and wrong in the abstract. We think that particular acts are wrong; we have a feeling that such and such acts are wrong and that others are right. This attitude of ours has grown up in us very largely in consequence of the circumstances in the midst of which we have lived. Without a capacity for such an acquisition to begin with, it goes without saying that the acquisition could not be gained. The young man who has never entered into business relations with his fellows has no feeling for the wrongness of overdrawing his account at the bank. It does not enter his consciousness that there can possibly be any wrong about it. He has the capacity, however, for understanding the relations that are involved in such an act, and he arouses with a start when it is pointed out to him that he is borrowing without even saying "By your leave"; that he is therefore making use of what does not belong to him.

The point I am trying to lead up to is this: that it is not necessary, even for practical purposes, that we labor with ourselves to determine when one becomes aware of the nature and quality of one's act. We never become fully aware of this; at best, we become aware of it only in spots. The only sensible question for us to ask when we are faced with the problem of an individual's responsibility is this: Is he capable of developing suitable adaptations to the social environment in which he lives or not? Specifically, is he capable of being made to realize that it is wrong to steal or to commit murder? And have the opportunities that the subject has had in the course of his educational history up to date been such as should normally have enabled him to make such adaptations? In other words, the question of responsibility is a question of educability, using this term in its broad sense. It is strange language for a psychologist, when he discusses the question whether Jean Gianini knew the nature and the quality of his act; it is stranger still when we hear this same psychologist saying that he did not know the nature and quality of his act, because such knowledge implies reasoning and reasoning is not to be found among persons whose mental age is below twelve.

ROBERT H. GAULT

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DISCUSSION

ASSOCIATION TEST AND PERSONALITY

Professor Whipple writes as follows on p. 54 of his new *Manual*:[1] "Woodworth and Wells, for example, talk of the free association test as having achieved, and being likely to retain, a place in the foremost rank among the methods of individual psychology, and assert that the form of it developed by Kent and Rosanoff gives perhaps the best objective correlate of temperament at present to hand, and that it has 'established a definite standard of normality'—statements that are hard to understand in the light of the results established to date."

Subjoined are references, in addition to those given by Professor Whipple, which are of particular interest in this regard:

APTEKMANN, E. Experimentelle Beiträge zur Psychologie des psychogalvanischen Phänomens. *Jahrb. f. Psychoanal. u. psychopathol. Forsch.*, 1912, 591–620.

BIRNBAUM, K. Über den Einfluss von Gefühlsfaktoren auf die Assoziationen. *Monat. f. Psychiat. u. Neur.*, 1912, **32**, 95–133, 194–220.

FÜRST, E. Statistische Untersuchungen über Wortassoziationen u. über familiäre Übereinstimmung im Reaktionstypus bei Ungebildeten. *J. f. Psychol. u. Neur.*, 1907, **9**, 243–278.

JUNG, C. G., & RIKLIN, F. Experimentelle Untersuchungen über Assoziationen Gesunder. *J. f. Psychol. u. Neur.*, 1904, **3**, 55–83, 145–164; 1904–1905, **4**, 24–67.

LANG, J. B. Über Assoziationsversuche bei Schizophrenen und den Mitgliedern ihrer Familien. *Jahrb. f. Psychoanal. u. psychopathol. Forsch.*, 1913, 705–755.

LANG, J. B. Zur Bestimmung des psychoanalytischen Widerstandes. *Psychol. Abhand.*, 1914, **1**, 1–35.

LANG, J. B., Eine Hypothese zur psychologischen Bedeutung der Verfolgungsidee. *Psychol. Abhand.*, 1914, **1**, 35–52.

PFENNINGER, W., Untersuchungen über die Konstanz und Wechsel der psychologischen Konstellation bei Normalen und Frühdementen (Schizophrenen). *Jahrb. f. Psychoanal. u. psychopathol. Forsch.*, 1911, **3**, 481–524.

RITTERSHAUS, E., Die Komplexforschung. *J. f. Psychol. u. Neur.*, 1910, **15**, 61–83; 184–220; **16**, 1–43.

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[1] WHIPPLE, G. M. *Manual of Mental and Physical Tests.* 2 ed., Part II: Complex Processes. Baltimore: Warwick & York, 1915.

These appear mainly, not entirely, in accord with the experience[2] leading to the generalization to which Professor Whipple's objections are raised.

F. L. Wells

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BOOKS RECEIVED

Seashore, C. E. *A Child Welfare Research Station.* Iowa City: Univ. of Iowa, 1915. Pp. 18.

Lyon, D. O. *The Relation of Quickness of Learning to Retentiveness* Pp. v + 60. 50 cents. (Arch. of Psychol., No. 34.)

Morgan, J. J. B. *The Overcoming of Distraction and Other Resistances.* New York: Science Press, 1916. Pp. v + 84. 75 cents. (Arch. of Psychol., No. 35.)

Dodge, R. & Benedict, F. G. *Psychological Effects of Alcohol.* Washington, D. C.: Carnegie Inst. of Washington, 1915. Pp. 281.

Slaughter, J. W. *The Adolescent.* (Introd. by J. J. Findlay.) New York: Macmillan, 1915. Pp. xv + 100.

Leonard, W. E. *Socrates: Master of Life.* Chicago: Open Court, 1915. Pp. vii + 118.

Smith, S. *Who is Insane?* New York: Macmillan, 1916. Pp. 285.

Martin, M. E. *The Transfer Effects of Practice in Cancellation Tests.* New York: Science Press, 1915. Pp. vi + 68. (Arch. of Psychol., No. 32.)

Stenquist, J. L., Thorndike, E. L. & Trabue, M. R. *The Intellectual Status of Children Who are Public Charges.* New York: Science Press, 1915. Pp. iii + 52. (Arch. of Psychol., No. 33.)

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[2] Briefly reported in *Amer. J. of Insan.*, 1913, 69, 897–906.

NOTES AND NEWS

At the request of the department, the department of philosophy at Smith College will hereafter be officially designated the department of philosophy and psychology. Dr. John T. Metcalf, instructor in psychology at Princeton, has been appointed instructor in psychology. Miss Ruth Swan Clark, assistant in psychology, has been granted a year's leave of absence.

The informal meeting of experimental psychologists will take place at Princeton, April 20–22.

An invitation has been received to attend the meeting of alienists and neurologists to be held under the auspices of the Chicago Medical Society, June 19 to 23, at La Salle Hotel, Chicago. Much attention will be directed to the problems of feeblemindedness. The circular of information says: "There has been no branch of medicine so neglected as the study of mental diseases and psychology. There should be a great reform in this respect within the near future."

The following items have been taken from the press:

Professor Ivan Pavlov, of the University of Petrograd, has died at the age of 67 years.

Dr. A. Alzheimer, professor at Breslau and one of the editors of the *Zeitschrift für die Gesammte Neurologie und Psychiatrie*, has died at the age of 52 years.

Dr. John W. Todd, of the University of North Dakota, has been given a leave of absence to act as head of the department of psychology at the University of Indiana. Professor John Winter, of Goschen College, takes Dr. Todd's work at North Dakota.

Leave of absence has been granted for the winter semester to Professor Ruger of Teachers College.

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THE

PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

THE FUNCTIONS OF THE CEREBRUM[1]

BY SHEPHERD IVORY FRANZ
Government Hospital for the Insane

One of the good results to be expected from the present great war is that of advancement of our knowledge regarding the functions and functional relations of the parts of the nervous system. Already indications are at hand that much attention is being directed to the effects of injuries of peripheral nerves, to sections of or disturbances with the spinal cord, and to destructions of and the effects of "shock" upon parts of the cerebellum and the cerebrum. The conditions of warfare are such that head injuries from bullets and from shrapnel are common and many of these include parts of the brain. The organization of the medical corps, the governmental and private training schools for cripples and for others who are unfitted to undertake their former occupations, and the neurological societies, although not necessarily coöperatively, will investigate those who survive and we shall have from these studies more facts regarding the injurious effects of cerebral lesions in man, and subsequent recoveries or consequent defects, than have been accumulated in many years. The recent medical journals contain many clinical accounts of lesions of the brain or other parts of the nervous system (see especially **15, 21, 34, 41, 42, 44, 47**) and the attention of physicians is being directed to them more and more on account of the resulting permanent defects. No such extensive and systematic study as those of Head and his co-workers on the peripheral nerves has yet appeared, but much promise of such contributions is given by the articles of Poppelreuter (42) and of Marburg and Ranzi (34), by the suggestions of Fröschels (21) and by the protest of the Neurological Society of Paris to the department of war that neurological cases are not sent sufficiently early to specialists for careful neurological and mental examinations.

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[1] For previous reviews see PSYCHOL. BULL., 1911, 8, 111–119; 1913, 10, 125–138; 1914, 11, 131–140.

General.—Anatomists have been divided with respect to the reason for the formation of the fissures of the brain. Some have held that they were produced by growth antagonism, *i. e.*, by the limited cranial capacity and the increase in the growth of the cells and fibers, while others have contended that the fissures were due to local differentiation of parts. Jefferson (24) shows that both factors are probably at work, although not necessarily in the same brain at the same time, for he brings forward as evidence opposed to the local differentiation view the fact that there is a considerable amount of areal differentiation in the brains of some monkeys (*Hapale jaccus* and *Lemur niger*) but there are few fissures. On the other hand, although careful maps of cyto- and myelo-architecture have not been made, it appears probable that not as great differentiation in structure has taken place in the cortices of cetacea and the elephant as in man, but the brains of the elephant and some cetacea have more furrows than are found in man and in the primates in general. In these cases, therefore, it appears probable that growth antagonism is the more important factor in fissure formation. On the other hand, Jefferson has also shown that when "furrows do appear they tend to do so at the edges of specialized areas," and he concludes that "we must look to architectural changes in the gray matter as the guiding influence in the *placing* of the furrows."

This question in some of its other relations has been discussed by Mills (36). He has pointed out that fissures have a certain amount of physiological significance not only in the cerebrum but also in the cerebellum. Mills's article does not lend itself to brief summarizing, and the reader is referred to it for the discussions, not only on the topic mentioned but for his consideration of neurobiotaxis, cytological anatomy and morphology, the cell type localization in the optic thalamus, and histological anatomy and morphology in relation to mental diseases.

Dogs with the hemispheres completely removed, similar to the brainless dog of Goltz, have been described by Zeliony (56). Two of these lived respectively only three and four days, a third lived over eleven months, and a fourth was living and shown to a society nearly sixteen months after the removal of both hemispheres. The dogs walked freely but showed considerable ataxia and in walking knocked against objects in the room; food when placed in the mouth was swallowed; sounds even of small intensity produced characteristic pricking of the ears (Goltz's dog reacted only to loud sounds and then only with head movements); the taste reactions were normal in that food caused a secretion of saliva and when it contained quinine it was rejected; light stimuli produced pupillary movements and the animal turned its head in the direction of the stimulus; but no conditioned reflexes were produced. The autopsies showed that the amount of cerebrum removed in all cases exceeded that removed by Goltz from the dog operated upon by him. These results show how much of the cerebrum may be removed without affecting very greatly the capability of the animal to react to ordinary forms of stimuli, although the animals were not very active and did not have that thing called "initiative" which is characteristic of animals with the cerebrum intact.

The difficulties attending the removal of large pieces of the cerebrum in dogs are very great, but in monkeys much greater. The complete removal of both hemispheres of the monkey has been accomplished by Karplus and Kreidl (27) with results of very great interest. Seventeen monkeys were (surgically) successfully operated upon, the animals having one hemisphere removed at one operation and the second at a subsequent session, from ten days to eleven months intervening. Many of the animals lived for only very brief periods, one day or less, but some lived for more than a week and one as long as twenty-six days after the removal of the second hemisphere. In the account of the work the authors give illustrations of the appearance of two animals with one hemisphere removed and of one animal with both hemispheres extirpated. Reproductions of microscopical sections of the brains of eight monkeys are also given. In a later communication Karplus (26) considers the degenerations in the pyramidal tracts of the spinal cord and the medulla oblongata in these animals.

The following conditions were found by Karplus and Kreidl in the monkeys from which one hemisphere had been removed, all the defects being located on the side opposite to the lesion. The animals sat upright in their cages, they ate food, climbed upon the bars of the cages, and performed other acts almost like a normal animal. An hour after the operation one animal was seen to brush away a fly which had alighted upon it. Immediately after the operation there was a marked degree of weakness in the contralateral extremities, which was more evident for the anterior than for the posterior segment. After the immediate effects of the operation had worn off so that casual observations failed to indicate defects, there were difficulties in grasping food and the movements of the hand and fingers were not as accurate as those on the normal side, and the movements of the distal segments were less normal than those at the elbow and shoulder. The capability of moving the head was apparently not disturbed. No convulsions were observed. In some cases when the sound side was moved there was also a contralateral movement (*i. e.*, of the affected side). There was no observed general mental change, but there was permanent hemianopsia, and an apparent contralateral hypesthesia although the animals reacted definitely to strong painful and temperature stimuli. No disturbances of the eye muscles were found except that there was a temporary nystagmus in two animals, and the animals appeared to hear and to discriminate sounds as well as usual for they reacted to the barking of dogs and to the chattering of other monkeys. No difference in effect of removing the right or the left hemisphere was observed, except that of the location of the defect on the contralateral sides.

These animals recovered to a great extent their ability to move the side affected by the first operation, and after the removal of the second hemisphere it was found that the side first affected was moved more than the newly affected side. In the animals lacking all of the cerebral cortex movements of the head and eyes were not disturbed but movements of all extremities were greatly affected; a kind of athetoid movement of the arm was made by some of the animals more than 100 times in succession. The day following the removal of the second hemisphere from one animal it took hold of the bars of the cage with the hand first paralyzed (because of removal of the first hemisphere) and pulled itself up into a sitting posture which it held for some time. In four cases tonic contractions of the extremities were noticed, in two cases there were clonic spasms, and one animal showed what appeared to be an intention tremor. When stimulated on the skin the animals lifted their heads, opened their eyelids, and there was dilation of the pupils. When sounds were made the ear movement reflexes were produced and at the same time there were eyelid movements. Light stimuli provoked pupillary constriction; two animals showed nystagmus.

The animals could cry as usual, and they did cry especially to painful stimuli, but there were no countenance changes coincident with the reflex responses. Most of the animals made no voluntary movements during the first days after the removal of the second hemisphere and they had their eyelids closed and reacted only slightly to stimuli. There appeared to be a kind of sleepy condition which could be changed to the waking-like state by strong stimuli. The great difficulty in feeding the animals probably was a factor in causing the death of some.

Not only because of the difficulty of the operative technique are these results of interest, but they have a definite interest in showing plainly that there are no real differences between the activities of the basal ganglia in the monkeys and in the lower animals, and that life can be sustained with the whole of the cerebral cortex removed in the so-called higher animals. They show also that the cerbral cortex is not nearly as important in the carrying out of some of the ordinary activities of an animal as has been supposed, and there is an indication that, as will also be shown below, the cortical mechanisms are not necessary for many of those functions which have been assumed by it.

This is confirmed by the results of the comparison of the brain of the patient examined by Robinson (43) with the clinical symptoms. This patient exhibited a slight enfeeblement of "intelligence" and some diminution in memory ability, while hearing, taste, and touch were almost normal and speech was scarcely interfered with. Vision was gradually lost. The brain showed a necrobiosis almost as far as the central fissure without any of the notable symptoms which have been supposed to be associated with lesions of the frontal portion of the cerebrum, and the author believes that the lack of symptoms are to be accounted for on the ground of compensatory processes, some parts of the cerebrum assuming functions normally undertaken by other parts when the latter are diseased. This would be found in those cases in which the pathological process was slow and there was sufficient time for the compensation.

That the definiteness of function is not absolute is well shown by the cases of nerve anastomosis which will be discussed below, but in this connection mention may be made of the results obtained by Claude, Dumas, and Porak (12) in cases in which paralyses of certain muscles exist, but there is a compensation by the utilization of other muscles which are not ordinarily, or strongly, used for the production of the kinds of movements normally brought about by those which were paralyzed. It is apparent that some possibility of functional adaptation exists in the brain for certain types of movement so that when a certain "center" and its connected muscles cannot be utilized other "centers" and their connecting muscles may be brought into play to bring about the desired result. This view is at the basis of the work of Kouindjy (29) who has by reëducation brought about a restoration of function in such conditions as tabes and astasia abasia, and who also mentions as a possibility the reëducation of paralytics.

Of the general effects following distrubances of the cerebrum Poppelreuter (42) and Marburg and Ranzi (34) have given accounts. Poppelreuter examined thirty patients with brain injuries and found not only the local effects which have been associated with localized lesions, but also general effects upon the "personality" of the individuals. In some cases the defects were almost psychological localizations (as distinct from cerebral-mental localizations). Thus, he reports the case of a student who had forgotten all chemical formulas, and another patient who could not do sums in division although there was no apparent aphasia and no other disturbances of the mental processes were evident.

Rothmann (44) has utilized a number of cerebral accidents to soldiers to point out that our experimental results on brain physiology of animals are being confirmed in man, and that the experimental facts point the way to diagnoses most clearly.

The works of both Krasnogorski and of Brown deal with the development of cortical cerebral control. That of Krasnogorski (31) considers the conditional reflexes in children and especially the development of this mode of reaction. He has found that these reflexes in children are essentially the same as in animals, although they differ in that they are rapidly formed and are much more stable, but may be readily replaced. He has found that they develop in the second half of the first year of life and that they are more apparent in the second year. He has expressed the belief that by the use of the conditional reflex test it is "possible to follow the entire development and gradual complication of the cortical activity in childhood, from the first few weeks of life, but it is also possible to recognize even in the first few months of life the characteristics and defects in functions of the cerebral cortex, and to apply as soon as possible the corresponding therapeutic measures."

Cortical Motor Control.—An extension of the investigation of the localization of the motor centers of the monkey brain has been made by Franz (18, part 2) in which he has shown that there are considerable differences in the spatial localization of the motor areas in the brains of different animals and in the two hemispheres of the same animal. The leg areas in some animals are larger than and in some smaller than the arm areas; there are considerable variations in the areal amounts concerned with the movements of different segments of the larger areas, for example for the toe and wrist movements; the areas for the arm and leg segments overlap to a great degree so that combined movements of both segments are normally obtained in some animals; a number of non-stimulable or relatively non-stimulable zones lying within stimulable areas were found. These results, with others from other observers, have led to the formulation of an hypothesis regarding the variability of function of different brains and its relation to differences of behavior. All of this work indicates that the motor areas lie in front of the central fissure. This is contrary to the view expressed by the late Professor Rothmann (45) who has continued to follow the conclusions of Munk, and who was the only recent well-known neurologist to adhere to the latter's views. Amantea (1) also upholds this view. Rothmann, working with dogs, found what he considered to be a zone for deep sensibility behind Munk's leg region, for the foreleg in the anterior suprasylvian gyrus and for the hind limb in the anterior part of the marginal gyrus. Destruction of these areas brought about derangements of the opposite extremities in all directions. In monkeys he found that destructions of the supramarginal gyrus produced difficulty of movement, of the nature of an ataxia, of the opposite arm, but no eye movement disorder. The extirpation of the postcentral region also produced motor disturbances of the opposite side, like an ataxia. At the same time the opposite arm was little used, although it could be used. He concludes that the "inactivity of the opposite arm after destruction of the postcentral gyrus as well as the restitution of isolated movements of the arm after destruction of the precentral gyrus shows the existence of motor elements in the cortex of the postcentral gyrus."

Brown has dealt with some of the more general conditions accompanying the activity of the cortex. Whether or not the act of walking is a learned act is a question the answer to which may help towards the solution of other similar problems. This Brown has taken up (9) in experiments upon the unborn fœtus of the cat. When the unborn fœtus is shelled out of the uterus into warm normal salt solution it sometimes shows movements of progression which are apparently spontaneous. The neural mechanisms are thus found to be able to function before birth, and the fact that such complex movements may be produced is evidence that walking is not a learned act which at a subsequent period becomes automatic or reflex. It appears that it is primarily a reflex activity, and that this activity may be first found in intrauterine life. The results of this study would serve to indicate that certain complex acts which we have been accustomed to believe must be learned by trial and error methods are not of that character, but that they may be only expressions of the physiological combinations of neural mechanisms which require for the activity a particular stimulus at a certain time. This is what is found to be true for the act of respiration. Brown has also (11) shown that if an electric stimulus be applied to a motor area and after the reaction is obtained it be applied again there is an increased result at the second application. The "facilitation" lasted for about ten seconds after a one-second stimulation, but after ten seconds there was no summation effect. This fact is of interest in connection with certain problems of motor learning.

Nerve Anastomosis and Recovery of Motor Function.—One of the most interesting topics in cerebral localization is that connected with the recovery of function after nerve anastomosis. It has been found that it is possible so to cross-join nerves which have been cut that complete motor recovery takes place. The fibers regenerate and although the central paths must have been altered there is a complete return of voluntary control, and, more remarkable, of mimetic movements in the segment involved. Operations of this character are not infrequently performed at the present time for those individuals who have lost, because of nerve lesions, certain important motor functions and the effort is made to take as a "leader" a nerve which has less important functions and join it to the peripheral end of the more important nerve which has become functionless. This has been done by Welty (53) who has described a case in which he used the central end of the hypoglossal nerve to join to the peripheral end of the facial nerve. At the end of a year the patient could move the face muscles, and three years after the operation it was found that the side of the face which was paralyzed was moved when the patient talked, the patient could close the eye, wrinkle the face, and lift the eyebrow. Some atrophy of the tongue was present on account of the use of the hypoglossal nerve and this probably also brought about the slight defect of speech which was noticed. In such cases of facial paralyses it has been more usual to use the spinal accessory nerve which innervates the shoulder muscles, the resulting paralysis of the shoulder being usually less important than the facial paralysis.

The experiments of Kennedy (28) have given us some fundamental facts regarding the conditions in nerve anastomosis in animals which may be applied directly to man. He found that he could cross the musculo-spiral nerve with the musculo-cutaneous, the median and the ulnar nerves, but at the same time he has been able to demonstrate that one nerve may be used for all of the functions involved. If, however, only one nerve (or set of nerves) with one original function is used the return of function of that character (for example, flexion) is quicker than that of the opposite function (extension). At the same time he has shown that if no nerve be eliminated the return of function is quicker. If the flexor nerve has been eliminated and the cortex area for flexion be stimulated after the return of voluntary function no response is obtained, and vice versa for the extension. Here, by way of an aside, it may be asked how the author has arrived at the conclusion that a certain spatially located point is the flexion center. In view of the normal reversability of action of the centers, as shown by Sherrington and Brown, and in view of the differences in distribution of the motor areas, as shown by Franz, an answer to this question is of the greatest importance if we are to accept some of the resulting theoretical conclusions. Kennedy believes that in the functional return there is a greater or less amount of reëducation of the cortical centers, such reëducation being related to or dependent upon the afferent impulses from the appropriate tissues. The adaptation of the cerebral centers is, however, not considered by Kennedy to be due entirely to a kind of reëducation, because in some of the animals there was no possibility of practice on certain of the movements, on account of the artificial limitation of these movements by means of plaster casts, bandages, etc. He believes that the recovery is due, partly at least, to "an alteration in the centers under the influence of altered afferent impulses from the muscles, the brain thus having the capacity quickly to adapt itself to such alteration," an explanation which appears to the reviewer to be subsumed under the general term reëducation.

The possibility of regeneration of nerves and function when two nerves of the same general kind, afferent or efferent, are used is well known at the present time. It has been disputed that there is any cross-recovery when an afferent nerve is joined to an efferent. The possibility of this kind of regeneration has been apparently demonstrated by Boeke (5), who united the peripheral cut end of the lingual nerve (afferent) to the central cut end of the hypoglossal nerve (efferent). After from two to five months Boeke tested for the return of motor power in the tongue and found this to be present. It should be noted, however, that neither of these two nerves can be considered to be "pure" in the sense that they respectively convey only afferent and efferent impulses, but the return of function is nevertheless noteworthy as indicating the possibility of such afferent-efferent junctions.

Closely allied to the subject of nerve anastomosis is that of muscle splitting. Kennedy (28) cites the case of a young girl with talipes equinus in whose leg the gastrocnemius was split, and part of the muscle was brought to the anterior part of the leg to replace the degenerated and functionless flexors which included the tibialis anticus. The transplanted part was found to be used for flexion as the other, undisturbed, part for the normal extension of the leg. In such cases Kennedy considers there is the same kind of adaptation in the cerebrum as in nerve anastomosis. Such an admission of the creation of new "centers" in the cerebrum goes far towards breaking down the uncritically-believed views of cerebral function. The compensations noted by Claude, Dumas, and Porak (12) should also be remembered.

Recovery of Motor Function after Cerebral Paralysis.—Although closely allied to the recoveries of motor function after nerve anastomosis those which follow the loss of the cerebral motor cortex or the destruction of the conduction fibers differ from the former in many ways. The possibility of recovery of this kind in animals has been recognized for a number of years. Trendelenburg (51) returns to the general problem, using monkeys, and he finds that although an animal loses its ability of voluntary movement immediately after the cortical ablation, movements of certain kinds may still be present. Thus, when the cortical area for the right arm was destroyed the right arm could be used for climbing, but the left alone was used for eating, but in about four weeks the animal began to use the right arm for the finer movements. When the right motor cortex was stimulated movements on the left were produced but none on the right. This shows that the recovery has not been due to an assumption of bilateral innervation by the sound side of the brain. It was also found that if the normal arm was restrained the paralyzed arm was moved more than if both arms were free. The movements which were produced were awkward but an adjustment could be made. There was not an actual inability to move but what appeared to be a disinclination to move. The dogs operated upon by Zeliony (56) and the monkeys of Karplus and Kreidl (27) also showed considerable ability to move, even though one or both hemispheres were taken away.

In man it has been known that a certain amount of recovery may take place within a brief period after such a cerebral accident as a hemorrhage, and an initial complete hemiplegia may give way to an incomplete paralysis. It has been thought, however, that the destruction of certain cerebral cells or their fibers would result in an absolute paralysis of certain parts. Several recent investigations show that this is not the case. Poppelreuter (42), for example, has had good success in the reëducation of paralytics with recent lesions. He has shown that systematic training gives very gratifying results in that movements supposedly forever gone have returned and the patients have learned to use such an instrument as the typewriter. Kouindjy (29) also has shown that reëducation is of value in cases of paralysis. The cases with which Poppelreuter and Kouindjy worked were recent cases; those with whom Mayer worked were two cases respectively of nine months and of two years' standing. Mayer (35) found that orthopedic treatment was beneficial in these two cases, although the most that resulted was the correction of the deformity of contracture which follows the initial motor inability. He obtained a betterment in the gait of his patients and an improvement in other motor functions. The most conclusive work showing that the destruction of cortical areas or of subcortical connections in man does not mean a complete loss of function is that of Franz, Scheetz, and Wilson (19). Taking patients who had had paralyses for periods of from five to twenty years they have shown that systematic passive exercises, combined with massage, may result in the return of certain movements, which is contrary to the belief of many neurologists. Most of the motor return was for the gross movements of the body, but it has been shown that coordinated movements such as throwing a ball, using a fan, sewing, etc., could be performed after a period of "training."

The results on man are directly comparable with those on animals, although the lesions in the human "experiments" cannot be as definitely determined as those in animals, without waiting for the natural deaths of the subjects. The human cases of paralysis have been selected on clinical grounds, and the possibility, although a very rare possibility, of the paralyses not being the result of lesions of the motor cells or fibers in the cerebrum must be kept in mind. Assuming the cerebral conditions to be those which the clinical conditions would suggest, it is possible to conclude that the motor cortex is not essential for the performance of voluntary actions, and although the definite localization of the cells concerned in the recovery has not been made, the suggestion is offered that the lenticular nucleus and other subcortical collections of gray matter may take part in this. If this can be proven, we shall have to accept what has already been hinted at in the past, viz., that the exclusive localization of "consciousness" in the cortical areas is neither not proven nor probable.

In connection with the recoveries of motor function by paralytics the study of Misch and Lotz (39) has an interest in that it shows clearly the fact that paralyzed muscles exhibit action currents, and the conclusion is apparent that innervation must proceed from some part of the nervous system other than the cerebral cortex.

As an example of the adaptation of the nervous system, and perhaps especially of the cerebrum, may be cited the results of Claude, Dumas, and Porak (12) on the recovery of certain functions when peripheral nerves have been divided. These authors find that even though certain muscles may be completely paralyzed there is a possibility of the performance of many tasks which these muscles usually perform. They find, for example, that the hand can be used even though certain muscles can not be employed in the acts, and that this "recovery" is due to the adaptation of other muscles to the particular ends. This substitution of action is sometimes mistaken for the recuperation of function by a paralyzed muscle. The amount of adaptation that a part may undergo is limited by the paralysis to some extent, but in the other direction only by the intelligence and ingenuity used to overcome the defect. The patients try repeatedly to find a method to overcome their deficiency and finally they usually succeed in finding some position in which a limb may be placed to bring about the desired action. These observations are similar to those of Kennedy (28) which have already been reported above, and they show that the adaptations, or new physiological connections, of which the cerebrum may be capable are not of minor importance, but that they are of most frequent occurrence even for the supposed simple motor operations. At the same time they serve to bring home the fact, which has often been emphasized since the time of Flourens but most frequently lost sight of, that the cerebrum is not a simply organized physiological organ, but one with most complex and intricate arrangements and possibilities of adaptation.

On the negative side of cerebral localization Dupuy (16) takes up those cases of so-called clinical cerebral paralysis without cerebral lesions, and the cases of cerebral motor(?) lesions without paralyses. He believes that most, if not all, of the facts can be explained on the Brown-Séquard hypothesis of inhibition, and this is very close to the more modern conclusions of von Monakow. In almost the same vein Robinson (43) has dealt with some negative cases. He cites one case in particular in which although there was slight "enfeeblement of intelligence" and diminution in memory, there was little or no interference with hearing, taste, touch, and speech, although vision had been gradually lost. At the autopsy the brain was found to be almost entirely destroyed nearly up to the central fissure. Robinson has concluded that there are notable compensations in cerebral activities whenever any part of the brain is destroyed, and these have an opportunity to be utilized especially when the destructive process is slow. This is not unlike those compensations, of whose existence we appear to know much more, between the cerebellum and the cerebrum.

Cortical Epilepsy.—Two studies on the brain states in experimental epilepsy have been made, respectively, by Karplus (25) and by Bikeles and Zbyszewski (4). Karplus attempted to determine the course of the impulses which gave rise to the diffuse convulsions when one hemisphere was stimulated, for contrary to what might a priori be supposed the stimulation of one hemisphere brings about convulsive conditions in both halves of the body. It was formerly believed that the corresponding motor cortex was affected in some manner, perhaps by way of the corpus callosum through which impulses initiated on one side passed to the corresponding areas on the other side. This has been shown not to be always the case, for when the corpus callosum is divided the bilateral convulsions can be produced. Karplus concludes that the bilateral connection is made by way of some fibers in the brain stem, but whether in the medulla oblongata or in the hypothalamus could not be settled. The results obtained by Karplus are not conclusive in that they do not definitely prove that the lower branching of the impulses is the "normal" method, for there are good reasons to believe in the close association of the two precentral (motor) areas by way of the corpus callosum, and it is known that if one pathway be blocked there is a possibility of using one or more normally little used routes. Bikeles and Zbyszewski have attempted to discover the reason for some of the improvement in epilepsy when different drugs are administered. They have obtained results which indicate that those drugs which help to reduce the convulsions do not always produce a decrease in the irritability of the motor cortex, and the results suggest that investigation of the whole cerebrospinal mechanism is necessary before we shall be able to explain the complex but apparently rhythmical phenomena in the epilepsies.

Subcortical and Subsidiary Motor Functions.—Using as a text the account of a patient whose brain showed lesions of the caudate and lenticular nuclei on the right side and of the caudate and part of the lenticular nuclei on the left side, Mills (37) has considered the relation of the cerebrum and the basal ganglia to muscular tonicity and to spasmodic phenomena. Spasmodic crying and other similar phenomena are considered by him to have relation to the cerebral cortex, not to the lenticular nuclei as others have contended, and he considers these phenomena to be examples of abnormal tonicity. He disputes Luciani's conclusions that the cerebellum is that part of the central nervous system which controls muscular tone, and considers that the midfrontal or intermediate precentral areas are concerned in that function. These regions are connected with the corpus striatum by association fibers, and he would have us believe that the caudate nucleus is like the cerebral cortex, or almost as a part of it. Holmes (23), on the other hand, has contended that the facts can be understood best as the result of the overactivity of subcortical motor centers "when freed from the inhibitory control of the cortex." This is especially true for the spasticity in paralysis. The involuntary movements which have been associated with thalamic lesions are also due to "disturbance of the normal functional equilibrium between the cerebellothalamic and the cortico-spinal systems." A third explanation of the spasticity in paralysis has been offered by Förster (17) who considers that the condition is due to a "sensory charging." Some have believed that the anterior horn cells in the spinal cord are those most concerned in the production of the spasticity, and that they act because of irritation from the pyramidal fibers. This does not help us to understand the fact that spasticity accompanies the state when all pyramidal fibers are destroyed, as in congenital spastic paraplegia, so that it is concluded that the anterior horn cells are "charged" by impulses coming from the periphery.

In the discussion of "tonic innervation" Wilson and Walshe (55) also deal with a similar matter. They have added three cases to the one previously described by Wilson in 1908, which showed tonic perseveration, which is a "condition in which there is an inability, owing to a central lesion, to relax a given innervation in any muscular group or groups." This has also been observed by Liepmann in states of apraxia. The condition is aggravated by attention to the movement, and they consider it to be an inability to "inhibit an innervation" which has been initiated. This is related to impairment of function of the cortico-spinal neurones, and is probably due to interference with "short transcortical paths from a hypothetical psychomotor center placed in front of the precentral gyrus." This, it will be noted, is similar to the explanation offered by Mills.

Southard (49) has presented an interesting account of some hyperkinetic conditions which are associated with thalamic lesions. He has taken cases showing diffuse lesions of the optic thalamus and compared them with other brain lesions with respect to involuntary and, perhaps also, voluntary motor activity. He had found a greater amount of motor activity in the former cases, but he does not believe the motor symptoms are indicative of motor function of the thalamus. In fact, he explains them as the effects of the "withdrawal of corticothalamic 'inhibitory' or 'switch-setting' impulses" or of "atrophy or aplasia of certain cerebellar connections." Here, therefore, is a condition in which a lesion of a kind of afferent mechanism brings about a symptom which appears to be that of the efferent system.

Some have claimed for the striatum a steadying influence on the motor impulses, but Lloyd (33) believes that it has sunk to a position of very slight importance, although at one time in the phylogenetic scale it was of great value. He contends that there is no special syndrome referable to the lenticular nucleus and that all the symptoms which others have referred to disturbances of that body are readily explainable on the ground of involvement of other related structures. He has disputed that the emotional reactions in lenticular cases are directly due to the lenticular nucleus lesions, and he concludes that laughing occurs in these cases only because some cortical fibers are cut off, and that the emotional reaction becomes a reflex. Nammack (40), on the other hand, agrees with the original contentions of Wilson regarding the lenticular syndrome, and reports a case characterized by the symptoms described by that author: involuntary movements, dysarthria, muscular weakness, spasticity, emotionalism. He accepts the explanation that in that state we deal with a disturbance of the extracortical motor system.

The stimulation of different parts of the basal ganglia by Brown has given results of interest in this connection. He used a chimpanzee about 30 months old. When happy this animal protruded its lips and gave a cry like "Ou, Ou, Ou," and when left alone it whimpered or moaned like a child (but did not sob) which at times developed into a scream. When tickled it retracted its lips, threw back its head, and the respirations became rapid and vocal. The condition just described was like that of a smile and the respiratory sound was like that of a whispered "Ha, Ha, Ha." When Brown stimulated the caudal pole of the optic thalamus he obtained respiratory changes similar to those when the intact animal was tickled (8). The stimulation of this part of the thalamus brought about *physical* reactions similar to those accompanying emotional states, but the author is careful to point out that "it cannot be assumed that a concomitant of the electrical stimulation is the conditioning of the emotion with which in every-day life we associate the reaction. It is more probable that in this stimulation we are only activating a link in the chain of mechanisms which normally take part in the state." Brown's other experiments (10) on the red nucleus are also of interest. Using the same, but decerebrated, chimpanzee he stimulated the region of the red nucleus, about 3 mm. above the anterior colliculi. The stimulation on one side produced usually homolateral flexion and contralateral extension, although at times a contralateral flexion was found. It would therefore appear that the red nucleus on one side has a bilateral connection, and that there is a compound or varying function (assuming that the spread of the current had been guarded against).

The contribution of van Valkenburg on the corpus callosum (52) is also of great interest. He gives a general review of about 50 articles dealing with callosal functions, results of personal experiments on the brains of rabbits, and accounts of 6 pathological cases in man. He disputes Dejerine's position that the occipital lobes are interconnected by way of the callosum, but does admit a fairly close connection of the frontal portions of the cerebrum. The precentral region on one side appears to be connected with the precentral and the postcentral regions on the opposite side. His general conclusions regarding the functions of the corpus callosum are negative. One is as follows: "The inability to follow the commissural connections of the frontal lobes, even though they probably exist, adds to our ignorance of the functional significance of these regions and renders physiological conclusions on this part of the corpus callosum impossible."

Sensory Functions.—As has already been indicated, Rothmann and Amantea hold to the view that the areas surrounding the central fissure of man, or of corresponding regions in animals, are sensory-motor. This is the view upheld by Luciani, and the experiments of Amantea (1) indicate how difficult it is to separate the sensory and motor functions. We have already considered this in relation to Southard's contribution (49). Amantea applied strychnine to the socalled motor cortex and obtained clonic movements upon stimulating these areas, which movements were not like those in an animal without strychnine. The motor phenomena were accompanied by what the author believes to be a hyperesthesic area of the skin, and he explains the motor differences in terms of sensory changes. It is just as easy, it seems no more improbable, to consider the motor difference in such cases to be directly motor rather than indirect phenomena. The matter can best, and can probably only, be settled by the results of careful examination of human pathological material, and such examinations indicate a separation of the motor area from the area concerned with sensory impulses from the skin and underlying tissues. This is indicated by the examinations of Sittig (48) and of Schröder (47). Although the results of their conclusions have not been confirmed anatomically by examination of the brains, the clinical facts warrant the belief that there were cortical lesions. Sittig described three cases, showing respectively paresthesia of the right thumb and the left angle of the mouth, a paresthesia between the thumb and index finger on the left hand and on the left upper part of the lip, and a paresthesia at the right angle of the mouth and on the right hand. Schröder's case showed a segmental distribution of the sensory disturbance limited to the two ulnar fingers and part of the middle finger, similar to the peripheral ulnar sensory "paralysis." There was hypalgesia, hyperesthesia, joint sensibility disturbance, but no difference in the two-point threshold and no temperature disturbance. This case was certainly due to cerebral accident. Kramer (30) also describes a case with subcortical lesion in which there were peculiar sensory disturbances of the nature of allochiria.

The sensory disturbances due to postcentral cortical lesions have been elevated to the dignity of a syndrome by Dejerine. That author and Mouzon (14) have described two additional cases, and Roussy and Bertrand (46) have contributed one case. In general, it has been found that lesions of the postcentral regions bring about complete or almost complete alteration of tactile discrimination, a marked alteration of the sense of attitude and astereognosis, but with integrity of the senses of pain and temperature, and of bony sensibility. Spiller (50) says that "there can now be little doubt that the parietal lobe is the great cortical sensory area; it is possible that sensation is represented in its different qualities in different parts of this lobe, and it is probable that different segments of the body are separately represented as regards sensation in the parietal lobe, the sensory area being near the corresponding motor area." On the other hand he says that there is no evidence to warrant the belief that the sensory fibers conducting certain kinds of impulses are collected in special parts of the internal capsule.

Of the subcortical centers for the skin and underlying tissues the thalamus has been most frequently open to study. Roussy described a so-called thalamic syndrome, which has been disputed and confirmed by others. Holmes returns to the problem (23) and shows that matters are not as simple as they have been believed to be. The thalamic syndrome, due to lesions of the thalamus, consists in an hemianesthesia or hypesthesia for all forms of superficial sensibility, and relatively greater disturbances of deep sensibility, associated with spontaneous pains, but although there is no real paralysis there is often an ataxia or choreiform or athetoid movements. Holmes points out that the spontaneous pains are not constant in location, but that they shift from side to side, and often are replaced by a dull sensation like an uncomfortable constriction. The over-reaction which was supposed to be constant is not due to a hyperexcitability, because more intense stimuli are needed. Several types may be differentiated, Holmes believes. If the lower portion of the thalamus be affected we get high threshold values for all forms of sensation, but if the fillet and its terminations escape only those forms of sensation will be affected which are concerned with the cerebral cortex.

Bramwell has described a number of cases of occipital lobe lesions which were accompanied by visual disturbances (6, 7). The most interesting case was one in which central vision was diminished, and this was found to be due to a lesion of the calcarine area. He concludes that the calcarine core serves as a basis for macular as distinct from panoramic vision, and also concludes that macular vision is "an evolution dependent upon (1) the development of binocular vision, *i. e.*, on the employment of corresponding points of the retinæ simultaneously, and on (2) the simultaneous development of the capacity to pay prolonged and individual attention to particular points of the general visual panorama. Macular vision is thus superimposed on the neuronic apparatus for panoramic, and the two types shade into one another." Dimmer has also described cases in which the central visual apparatus was injured (15). He believes that the macula has a representation in the calcarine fissure, and that the facts of his second case speak for the localization of this area at the posterior portion of the fissure. Pick's study (41) is not of special value in connection with localization, but gives interesting data regarding "orientation." Rothmann's cases (44) also tend to confirm the localization of the visual central apparatus in the occipital lobes. The condition in Rothmann's cases is more interesting in view of the recovery which took place.

The general facts obtained on brainless animals by Zeliony (56) and by Karplus and Kreidl (27) have already been discussed. The former extirpated the hemispheres of dogs and found that, although conditioned reflexes to light could not be obtained, light stimuli did bring about pupillary movements and at times the animals turned the head toward the source of the stimulation. There is no certainty that these reactions are more than reflex. Karplus and Kreidl also found with one hemisphere removed that there were no disturbances of the eye movements, except a temporary nystagmus in one animal, and there was an apparent restitution to such an extent that casual observation failed to show any defect. When both hemispheres had been removed the movements of the head and eyes did not seem to be affected, although two animals did show nystagmus, but the pupils reacted to light stimuli. Here also it is not possible to say that the reactions to light stimuli were at all like those which a normal animal would have.

Zeliony's observation regarding taste reactions is of interest (56). He noted that the dogs deprived of their cerebral hemispheres ate when meat was given to them and that meat containing quinine was rejected. Whether or not this is a reflex phenomenon could not be settled.

Speech and Other Association Functions.—A general review of the subject of aphasia has been written by Mingazzini (38). He holds neither to the newer view of Marie regarding the intimate relation of the lenticular nucleus to motor aphasia, nor to the older cortical

Broca's area view, for the destruction of either or both of these areas may be productive of an inability to speak. He enlarges the so-called Broca area to include the anterior portion of the insula and the operculum Rolandi, but he would not exclude the lenticular nucleus as an element in the prodcution of speech. In the cortical regions are to be found the hypothetical "engrams" or motor syllable images (in the motor speech areas). Sensory aphasia is due to lesions of the temporal areas, the transverse posterior temporal and the posterior third of the superior temporal. It is not possible, the author believes, to differentiate an area destruction of which brings about an amnesia for names, nor can verbal blindness or agraphia be said to be associated with defined lesions.

The work of the late Hughlings Jackson has been made the occasion of a special number of *Brain*, with an introductory article by the editor, Henry Head (22). Head points out that as early as 1868 Jackson showed that aphasic patients could be divided into two classes, those who could say nothing or little, and those who could speak but used words wrongly. The following quotations serve to give the main substance of the article: "The higher and voluntary aspects of speech tend to suffer more than the lower or more automatic, ... Writing is affected, not as a separate 'faculty,' but as a part of the failure to propositionize words. . . . External and internal speech are identical. . . . In the majority of cases of affections of speech mental images are unaffected. . . . (This) has been entirely neglected by neurologists. For almost every hypothesis propounded in the last forty years presupposes some defect in 'auditory' or 'visual word images'." It is encouraging to find at least one neurologist who doubts the accuracy of the assumption of the definite mental-cerebral relations, which assumption has been the reason for more unscientific work in this field than any other single thing.

In the discussion on motor aphasia, anarthria, and apraxia before the International Congress of Medicine at London the papers by Dejerine and by Liepmann were of the greatest value, giving views widely different but unfortunately crowded with the mental-cerebral assumptions which have been disputed by Head, and which are not supported by careful analyses of the material. Dejerine takes up briefly the history of motor aphasia (aphemia) and of anarthria, and distinguishes the two (13). By anarthria Dejerine means a difficulty in speaking which is of motor origin, such as spasm, paralysis, or incoördination. By motor aphasia he designates those disorders due to a loss of vocal representation of words, or which result from the loss of ideo-motor power. The true motor aphasia of Broca is, according to Dejerine, due to a loss of motor images of articulation. Anatomically, anarthria may be due to lesions of the medulla oblongata, or of the cerebral cortex, or of the cortico-bulbar fibers, and when lesions are bilateral a permanent anarthria may be produced by destructions of the opercula Rolandi, but the lenticular nucleus does not, the author believes, have a direct or intrinsic relation to the condition. In discussing those cases which are negative, with lesions of the left third frontal without motor aphasia, Dejerine assumes them to be due to the fact that the individuals were not really right-handed. He says they were cases of ambidexterity or of sinistrality, who have appeared to be right-handed on account of their education. These negative cases, which threatened to overturn the whole of the classical aphasia doctrines, are, therefore, not in opposition to but in accordance with the views expressed by Broca and by Wernicke, and the theory of aphasia remains intact.

Liepmann has discussed in more detail the subject of apraxia (32). He defines apraxia as the loss of the ability to execute movements for purposes. The acquirements of the motor apparatus can be considered in three ways, and disturbances of the ways in which the motor apparatus may work lead respectively to (1) ideational apraxia, (2) limb (*Glied*) apraxia, and (3) ideo-kinetic apraxia. This also applies to the motor speech organs. Thus, amnestic aphasia, or the difficulty in "finding" words, is an amnestic apraxia. Praxia, the normal condition, presupposes the use of the motor apparatus without an object, as for example the use of the arm and hand in making sawing movements when no saw is used. This is true for the vocal apparatus, of which at least part (the mouth) is intended to deal with food, but in speech there is a "free, objectiveless movement." "The inferiority of the right hemisphere for phasia and praxia can be referred to one and the same deficiency, *i. e.*, that of not directing movements without objects." The work of Liepmann is, like that of Dejerine, loaded with cerebral-mental assumptions, such as "memory for innervation complexes is one which has no equivalent in the consciousness" although "for simple and much practiced movements . . . such a pure kinetic memory" exists.

Tonic perseveration which was described by Wilson, and symptoms of which have been described in some apraxia cases by Liepmann, is the subject of a special communication by Wilson and

Walshe (55). They describe three cases with tonic perseveration, with differing concomitant symptoms. One patient had apraxia and hemiplegia, and after the removal of a large tumor from the right hemisphere the tonic innervation disappeared, leaving only a typical hemiplegia. A second patient had a tumor removed from the brain and the abnormal tonicity disappeared but a slight hemiplegia remained. The tonic innervation may occur without praxia disturbances, but it is usually associated with apraxia or dyspraxia, because of the location of the lesion in the frontal area.

The treatment of aphasia, the recovery of speech function by aphasics, has been the subject of a number of articles since Broca first expressed the belief that reëducation would be of advantage in these cases. This matter has recently been dealt with by Wilson and by Fröschels. Wilson (54) does not advocate the artificial methods recommended by most of the German writers, as illustrated by Gutzmann, but takes the natural method of teaching names rather than individual sounds. He concludes that there is evidence to warrant the belief that auxiliary mechanisms are developed in undamaged areas of the cerebrum. Fröschels (20, 21) cites results in seven cases, but gives no adequate account of the course of the reëducation. He has used the method of saying a word in the patient's ear, and then showing him the mouth as it is placed to say the word. Some patients may learn to read the lips, as do the deaf. In his second paper he advocates the early training of these defectives, a view consistent with what we know of other cerebral defectives.

On the negative side Dupuy (16) cites facts which he considers do not warrant the localizations which have been made. He ridicules the explanations of Mendel's case, aphasia with rightsided lesion, that the patient was not really righthanded, for he points out that the family of the patient were righthanded and that if the patient had been normally lefthanded such a condition would, or should, have been evidenced in the family at some point. He believes that most, if not all, of the facts can be understood on the Brown-Séquard hypothesis of inhibition. Bickel (3) has also dealt with a negative case of lesion of Broca's area and of the first temporal lobe on the left in a righthanded individual. This patient gave no prominent signs of motor aphasia, although there was a slowing and an unclearness of speech, and some difficulty in finding words.

Bianchi (2) has dealt with the relations of the frontal lobes, and has shown that they have connections with all other parts of the cerebral cortex, but with none of the basal ganglia except the putamen. "The most certain statement that we can make is that the frontal lobe has direct relations with the motor zone by means of the short fibers, and direct relations with the other parts of the cortex through two great bundles." Lesions of this region do not produce disturbances of psychical activities. By a comparison of the clinical findings and the extent and severity of frontal lobe atrophies Franz (18, part 1) has come to the conclusion that there exists no direct relation.

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REFLEX MECHANISMS AND THE PHYSIOLOGY OF NERVE[1]

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The most important general discussion of the past two years is probably to be found in the two papers by R. S. Lillie (41, 42) on the nature of excitation and conduction especially in nerve tissue. Arguing in part from the close positive correlation which is found in many muscle and nerve tissues "between the rate at which the electrical variation [action-current] rises to its maximum at any region of the excited tissue, and the rate at which the excitation-wave is propagated in that tissue," Lillie (41) comes to the view "that the electrical variation is itself the essential feature of the excitation-process, and constitutes that functional component of the local process which directly excites the adjoining regions of the tissue to activity; if so, its rate of development must determine the rate at which excitation is transmitted from the active region of the tissue to those adjoining." The author suggests that the action-current initiated by local stimulation itself stimulates electrically the nerve *at a distance* from the locus of excitation—a distance, it may be, of 2 or 3 centimeters. The "rate at which" the "electrical variation rises to its maximum is the chief factor in determining the velocity of conduction"; but a second factor is the maximal distance from the already active region at which the action-current there will cause a second stimulation (action-current) farther on along the nerve. This would seem to make conduction proceed by discrete leaps. Why the action-current at the point of stimulation should not first excite adjacent points, and these the next-adjacent, is not made clear: yet if conduction *is* thus continuous, rather than discrete, the second factor cited as governing the velocity of conduction would not figure (cf. p. 437). Several interesting facts are adduced to show that the electrical variation is not merely an index of some underlying physiological process, but is itself the central fact. In living tissues in general the rate of conduction "shows no appreciable correlation with ionic or other diffusion-velocities, nor with the transmission-velocities of mechanical, thermal, or electrical influences." In the second paper (42) Lillie describes a modified form of Bernstein's "membrane theory" of the bio-electric processes. The nerve is surrounded by a semipermeable membrane. Ordinarily this is probably permeable to certain cations only, but stimulation renders it (at the point stimulated) permeable to ions of both classes. Thus the potential difference between the interior of the nerve and the outer medium is suddenly lowered at the site of stimulation. "During the resting condition cations are unable to leave the cell because of the impermeability of the surface-film to anions and the resulting electrostatic stress; the normal polarized condition of the resting element (with outer surface positive) is thus accounted for. If then at any point in the surface the membrane is altered by stimulation so as to allow anions to leave the cell, the electrostatic tension holding back cations is at once released—not only at the region of stimulation, but at all other points of the cell-surface; cations are then free to leave the cell in numbers equivalent to the anions; in other words, a current then flows between unaltered and altered regions. . . ." Within the cell this current flows from active towards inactive regions, and in the external medium in the reverse direction. Nerve conduction involves the passage of a permeability- or depolarization-wave. Both papers are admirably clear. Lillie has elsewhere (43) printed a more popular exposition of the process of stimulation in living tissue.

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[1] For previous reviews of these topics see PSYCHOL. BULL., 1911, 8, 119–130, 136–139; 1913, 10, 146–152; 1914, 11, 140–150.

McClendon (44) argues that "if stimulation consists in increase in permeability, we should expect anæsthetics to prevent this change." Working with eggs of the pike, he finds this to be the case. "Stimulation and anæsthesia seem to be antagonistic states." Similarly Osterhout, Joel (38), and others have found that anesthetics decrease permeability. Traube too (58, 59) finds this, but he believes that the result is indirectly attained. Owing to certain striking properties which are common to all narcotics, they readily penetrate the nerve-cell walls, and then dissolve or, better, precipitate the lipoids contained inside. The precipitates accumulate on the inner surface of the cell-membrane, and thus create a "dead space" which renders the membrane impermeable. The cell cannot now be stimulated. While the narcotic is penetrating the cell, and before precipitates have formed, the tissue presents a phase of increased excitability. Traube criticizes the theory of Höber and Joel (38) according to which the tissue should exhibit a phase of depression followed, in the deeper stage of anesthesia, by exaltation: which would not agree with common observation.

While Lillie makes electrical phenomena the central factor in the processes of stimulation and conduction, he does not seek to deny certain other phenomena which would seem to relate these processes more closely to "metabolism" in the familiar sense (43, p. 589). But other observers emphasize the metabolic aspects more strongly. Thus Montuori (49) argues for Verworn's well-known theory that the essence of narcosis (or anæsthesia) is asphyxiation. He finds that by gradually raising the temperature (from 18° C. to 28° C.) of the water in which tadpoles of *Bufo vulgaris* are living, he has rendered them more resistant to both asphyxiation and narcotics (alcohol, ether, chloroform, etc.). Tashiro and Adams (56) believe that "oxygen is a primary factor in the excitability of the nerve, as well as in the conductance of the nerve impulse"; and that protoplasmic irritability is essentially a chemical process. Gottschalk (32) holds that the nerves of cold-blooded animals contain some reserve of oxygen, "probably in loose chemical combination"; and "a smaller quantity in physical solution." And Thörner (57) shows that the irritability of medullated nerve (frog) is higher in oxygen than in air (though its conductivity is not modified). Moldovan and Weinfurter (48) believe, because the narcotics fall into *one* serial arrangement with regard to several distinct chemical properties (power to dissolve lipoids, to asphyxiate, to destroy ferments, etc.), that the fundamental nature of narcosis is probably different in different tissues. They believe that in the "cerebral cortex" narcosis is primarily suffocation; but that in "nerve tissue" (axone?) it is something else. Tashiro and Adams (56), from measurements with the biometer on the claw nerve of the Spider Crab, conclude that "there is a perfect parallelism between the state of excitability and the CO_2 output." "All irritable tissues give off CO_2, resting nerves being no exception": and "when irritable tissue is stimulated, this CO_2 production is increased"; it is greatly depressed by anæsthetization. They suggest that there are two metabolic phases in nerve: (1) The formation of an organic peroxide; (2) the "decomposition of this peroxide by peroxidase" (as held by Gasser and Lovenhart). Sanders (53) finds that local warming produces a region of decrement in the frog nerve: if the nerve is plentifully supplied with oxygen, more heat is required to produce this decrement. Benda (5) insists strongly on the difference between the irritability of a nerve and the efficiency of it after it is stimulated ("*Leistungsfähigkeit*").

The all-or-none law seems to be meeting with wide acceptance.

Adrian (1), after an interesting discussion, says: "We may conclude that there is an all-or-none relation between the stimulus and the propagated disturbance [in nerve] because the disturbance will always be set up as soon as the local excitatory change has reached a certain critical intensity at any point on the nerve; any further increase in the local change will have no effect on the propagated disturbance on account of the refractory state which is developed as soon as the disturbance is set in motion." In agreement with this last point Eichholtz (23) finds that the *minimal* summation-time of a spinal reflex (frog) is "dependent on the refractory period of the afferent nerve." Adrian (3) finds that change of temperature affects all phases of the recovery period alike, so that probably a single process accounts for all the phenomena of the refractory state. Adrian, further (2), confirms the observation of Koike (disputed by Fröhlich) that the rate of conduction in a region of decrement is constant, not becoming slower as the impulse becomes feebler. This rate is, however, everywhere slower than in normal nerve. Rehorn (52) states that in a region of decrement the decrease of the nervous impulse is a "linear function" of the distance traversed (but for the validity of this cf. Rehorn, p. 65). In asphyxiation the propagated disturbance suffers earlier than the local excitatory process. Fredericq (30) finds that under increasing mechanical compression conduction remains normal until at some point conduction suddenly ceases entirely. If the compression is removed conduction as suddenly returns. Hoffmann (35) offers evidence against the all-or-none law holding for the nerves of crustaceans (crab and lobster). He does not seek to argue against the principle in the case of vertebrates. But Uexküll and Tirala (61) raise what is probably a valid objection to Hoffmann's interpretation of his work with crustaceans. They also offer the view that the "inhibitory" crustacean nerve functions by "sucking" nervous energy out of the muscle. Elrington (24) thinks that the lowered reflex threshold (frog) in strychnine poisoning is incompatible with the all-or-none law: but since "with faradic stimulation it can be shown that the weakest stimuli which are able under strychnine poisoning to produce a reflex contraction, have always also an effect in the normal spinal cord," he admits that the all-or-none law is still valid. The reviewer does not at all follow the author's reasoning. Forbes and Gregg (29) express themselves with considerable reserve regarding the validity of the all-or-none principle. By means of a special arrangement of electrodes laid on an arthropod nerve Hoffmann (34) has observed the way in which two nerve impulses travelling in opposite directions on the same fiber pass each other. Impulses produced by induction shocks at 50 per sec. if maximal interfere with and cancel each other: if submaximal they weaken but succeed in passing each other, and show something approaching an algebraic summation of their intensities. Hoffmann accepts the all-or-none principle, in vertebrates, for both nerve and muscle. By others the law is held to be more securely established for nerve than for muscle.

Boeke (8) has continued his interesting experiments in regeneration. Regenerating fibers, whether sensory or motor, once started to grow along a path formerly occupied by a (now degenerated) fiber, "cannot leave" this path. Thus Boeke succeeded in making a chiefly sensory nerve (lingualis, of the hedgehog) regenerate along the path formerly occupied by a chiefly motor nerve (hypoglossus). This nerve finally "formed terminal arborizations on the muscle-fibers" which at least so far restored the motor innervation of the muscle as to stop the fibrillary tremor exhibited by the muscle after its proper motor nerve had been cut, and also to save the muscle from degeneration. Likewise motor fibers (hypoglossus) having regenerated in the path of the sensory lingualis either restored or in some way caused to reappear the degenerated taste-buds.

Troland (60) presents an interesting view of sensory adaptation as a chemical equilibrium. The theory appears to coincide with empirical facts better than does the well-known theory of Hering, and it avoids Hering's very dubious assumption that stimuli excite anabolic as well as katabolic processes in protoplasm. Troland succeeds in lucidly stating physiological fact in mathematical notation. The paper is important in several respects.

Schwenker (54) finds three kinds of contraction process in striated muscle: the first is rapid and rapidly reversible; the second is slow and less rapidly reversible; the third is slow, irreversible, and connected with the death of the muscle. The second sort is probably responsible for general muscle tonus. Now in "tonic innervation" Ernst (25) finds that no carbohydrates are consumed. He believes that slow muscle tonus and rapid muscle jerk depend on different chemical processes going on in different substances. Jensen (37) dissents from this two-substance theory; but he believes that tonic contraction is maintained without flow or "mobilization of electrolytes," while the rapid jerk involves such mobilization. From his work on the thermal stimulation of muscle, he concludes that all contraction is based on the katabolism of an unstable substance which, once initiated, continues of itself. Heat, he believes, stimulates muscle directly, and not through the intermediation of "autoelectric stimuli." Mansfeld and Lukács (45) show that striated muscles have two sorts of motor end-organs and two forms of innervation; by medullated and by non-medullated (sympathetic) fibers. Tonic innervation, which they call "chemical tonus" (and of which Mansfeld (46) states that the "respiratory metabolism" is the result and index), is maintained even in skeletal muscle *solely* by the sympathetic fibers. This appears to be an important paper. On the other hand, Kuno (39) contends that at least in *Rana esculenta* the sympathetic system plays no part in maintaining the tonus of the hind limbs. He finds the anterior roots of the cord, however, to be important here. Weizsäcker (62), from myothermic experiments on the rapid muscle jerk, concludes that this involves "two different machines"—(1) a contraction mechanism and (2) an oxidative recovery mechanism. The first is non-oxidative and consists in turn of two part-processes, "a part which provides energy, and a part which transforms this into mechanical energy: the former can be active without the latter" (in which case the energy provided turns into heat). This energy yielded by the first "part" comes from some "non-oxidative" store, as say, of glycogen or sugar. Meigs (47) objects to an earlier paper of Hürthle who had undertaken to show that striated muscle on contracting does *not* increase in volume. Meigs supports Engelmann's "*Quellungshypothese*." Hürthle (36) replies that his former findings against this hypothesis are valid. Snyder (55) holds that smooth muscle contracts and maintains its contraction with less expenditure through oxidation than does striated muscle. From indirect stimulation of smooth muscle he records an "absence of any measurable amounts of heat production accompanying development of tension." The gaseous exchanges in cat muscle under decerebrate rigidity are notoriously low. Langley (40) finds "that curari and nicotine produce their effects by an action on the neural region of the muscle fiber and not by an action on the nerve endings, so that the explanation of the specific action must depend upon a difference in the neural and non-neural region of the muscle fibers."

In connection with reflex process there has been considerable discussion as to the periodicity of the nervous impulse. In what will be one of his last published papers (50) the late Hans Piper refutes certain objections of Garten and Dittler, and reasserts his earlier statement that the normal action-current of voluntary forearm flexion oscillates approximately 50 times per second. The fundamental unit of neuro-muscular action is the two-phase action-wave. In some persons ("Type II") the action-current of forearm flexion has a period much higher than 50 per sec., and inconstant. Piper believes that in such cases the action-currents of the separate fibrillæ are passing down the nerve out of phase with one another ("platoon fire"), so that the galvanometer records a varying and much higher number of oscillations. Even here the period in the individual fibrilla is probably 50 per sec. There is good evidence for this interpretation. In "Type I" the action-currents pass along the separate fibrillæ all in phase ("volley fire"), and the 50-rhythm is exhibited clearly. Any person appears to be permanently of one type or of the other; and Piper does not deem one more normal or advantageous than the other. There are persons of intermediate type. In extreme fatigue the 50-frequency goes down to 25 or even 20 per sec., although the amplitude of each action-wave remains the same. The paper is clear and of fundamental importance. It is confirmed in all points by Fahrenkamp (26) from his studies of the action-current in strychnine tetanus. The author inclines to the view that the 50-rhythm originates in the spinal cord. Gregor and Schilder (33) record the same 50-rate in continued voluntary contractions: in voluntary relaxation the rate decreases gradually to the point of complete relaxation (which directly confirms a point made by Forbes and Gregg (29): see below). The mental state of fear produces no characteristic change of rate; but when the rate has been decreased by fatigue (cf. Piper) a sudden fright increases the height of each crest, and still does not change the rate. A single "psychic impulse" to move the finger gives an action-current of at least 3 or 4 crests.

Dittler and Günther (22) dispute Piper's 50-rhythm. They find the normal action-current for voluntary innervation (man) to range from 120 to 240 oscillations per sec., with a general average at about 180 per sec. Beritoff (6), who does not accept the all-or-none principle for either nerve or muscle, has studied the action-currents of M. semitendinosus (frog) induced by faradic stimulation of the central stump of a severed posterior root. He finds the action-current fluctuating from 50 to 150 oscillations per sec., with a general average around 70 to 80 per sec. These are practically the same rates which the author found in previous experiments in which the posterior roots had not been cut, *i. e.*, in which proprioception remained. The rhythm of the action-current of the muscle (and motor-nerve?) in the spinal reflex is largely, but not wholly, independent of the rate of faradic afferent stimulation. There is an after-discharge in which both frequency and intensity of the action-current gradually decrease. If the rate of stimulation is very slow it can generally be observed that the muscles receive 3 or 4 innervations, of decreasing strength, for each stimulation. This number is increased when the cordal segment involved is poisoned with strychnine. In three other connected papers (7) Beritoff records very similar results. With afferent stimulations of 20 to 40 per sec. the muscular action-current generally shows a group of 3 or 4 decreasing crests for each stimulation. If the stimulation frequency is 50 to 100 per sec. the muscular action-current is apt to show the very same frequency. It is to be hoped that a further understanding of "volley and platoon fire" will serve to bring these results into somewhat better agreement with those of other observers. Beritoff believes in a specifically "inhibitory" nerve-impulse, which "sums algebraically" with excitatory impulses. Hoffmann and Snyder (55) agree that in the knee-jerk, at least, "a skeletal muscle is made to contract by a normal reflex consisting of one, and one nervous impulse only," as contrasted with "a cataract of nervous impulses . . . poured in." Most authors, however, seem to accept the view of Ewald (1911), that reflex innervation, whether natural or artificial, is periodic innervation. Hoffmann (34) believes that for every muscle there is probably some optimal rhythm of excitation (cf. Sherrington).

Forbes and Gregg (29) have an important paper on the physiology of nerve and muscle, the technique of registering action-currents, and especially on the correlation between the strength of a reflex stimulus and the strength of the resulting muscular response. "It is a salient fact in connection with excitable tissues that they may respond to continuous stimulation discontinuously, *i. e.*, with a succession of separate propagated disturbances"; and this is of course especially true of the reflex arc. Now the all-or-none law of nerve-action raises a serious problem as to how the observed correlation between the strength of a reflex stimulus and that of the muscular response is produced. Reasons are given why this correlation "cannot be explained by the assumption that an additional afferent nerve fiber is excited at each perceptible increase in intensity of sensory stimulation." They suggest that the intenser stimuli produce a nerve impulse of higher *frequency* (each pulsation being still "all-or-none"), which will in turn cause the muscle to contract more strongly. This seems to the reviewer a very important theory (for which, however, priority may perhaps be claimed by Verworn or his school). "The work of Lucas and Adrian shows that the recovery of excitability in nerve following its refractory period is such that a sustained stimulus of great intensity would produce a more rapidly rhythmic response than one of less intensity." Ewald showed in 1911 (compare 35) that in crustaceans the strength of the contraction of the claw muscle depends on the frequency of the innervating impulse: and an observation by Gregor and Schilder (cited above) confirms the same view for human reflexes. It is true that Dittler and Günther (22) contend that the strength of voluntary contraction depends not on the frequency but on the intensity of the action-current. Forbes and Gregg (28) have also described an interesting recording camera for use in connection with the Einthoven galvanometer. They show that "stimuli occurring within less than one-hundredth of a second of each other appear to cause summation in the flexion reflex, while stimuli a tenth of a second apart fail to do so, the second response showing a decrement in consequence of the first."

Brown (9) studies rhythmic reflex movements of the "progression" type. "Rhythmic progression is conditioned by an equal balance of two antagonistic central activities," but it is remarkably independent of proprio-ceptive or other afferent mechanisms, and even it "may be exhibited in the lumbar spinal centers alone, and is then not conditioned by the activity of higher centers." "The rhythm may best be explained as conditioned by some function of the interconnexion of efferent neurones." The spinal center is compared to the respiratory center. This theory "tends to displace the reflex as the unit of activity in the spinal centers and to put in its stead a mechanism composed of efferent neurones. Perhaps the simplest unitary mechanism is one formed of the efferent neurones to two antagonistic muscles"; perhaps each such neurone, or "half-center," sends a side fiber to the other half-center, this fiber having the function of depressing that half-center. The efferent half-centers were probably once functionally independent of any afferent neurone. Brown's other papers (10 to 21, inclusive) deal with the compounding of reflexes in several sorts of spinal preparation. Important, and in some respects interesting, as these papers undoubtedly are, they present a vast mass of minute detail which is insusceptible of being reviewed, and a minimum of new insight into the spinal mechanism. The reviewer was unable to discover any general *principles* here emerging which have not been described in previous papers by Sherrington. From stimulation of the motor cortex of the monkey it was observed (18) that the maximum time within which facilitation (summation) of liminal stimuli occurs, is about 10 seconds.

Asayama (4) studies the proprio-ceptive reflex as obtained by mechanically stretching a flexor muscle. The "stretch-reflex" can be evoked by an elongation (if it is not too slow) of one one-hundredth of the length of the muscle; the response is sometimes multiple (2–4 twitches); its latent period is less than that of "reflexes evoked from the muscle by other afferent channels." When all such reflexes are completely fatigued, the proprio-ceptive reflex "persists unaffected by that fatigue"; and this argues that the seat of reflex fatigue "lies mainly in some part of the reflex-arc on the afferent side of the motoneurones." Similarly Benda (5) finds that the depressing effect of Ca and Mg ions (introduced in the blood) seems to lie in the nerve (or its end-organ) rather than in the muscle, for it is hardly evident in direct stimulation of the muscle.

Porter (51) states that the flexion reflex is one whose threshold is normally low, and this is not greatly reduced by strychnine. But strychnine reduces the threshold of those reflexes whose threshold is normally high, to about that of the flexion reflex. In other words the proprio-lateral flexion reflex is normally often "in the highest state of irritability of which the mechanism is capable." Mansfeld (46) believes that very large doses of strychnine may lame the motor-endings of sympathetic nerves. Gildemeister (31) attributes the psycho-galvanic reflex mainly to activity of the sweat glands. He doubts whether the phenomenon should be called "psycho"-galvanic.

Forbes and Sherrington (27) find that "certain acoustic stimuli excite movements of the pinna, neck, tail and limbs in the cat even within a short time after complete removal of the cerebral hemispheres, striata, thalami, corpora geniculata," etc. "The turning of the head and perhaps the movements of the pinna appear interpretable as orientation reflexes, *i. e.*, reactions adjusting the organism in its relation to the spatial locus of the stimuli, and were the rest of the brain present, helping the organism to locate the sound." Some of the movements elicited by the sound stimuli were "mimetic," *e. g.*, similar to those that normally indicate anger.

Such sounds as "the barking of a dog, yowling of a cat, or the whistling of birds" were specially efficient in eliciting this mimesis.

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NOTES AND NEWS

The present number of the Bulletin dealing with physiological psychology has been prepared under the editorial supervision of Professor R. P. Angier, of Yale University.

The following items have been taken from the press:

Dr. H. L. Hollingworth has been promoted to an associate professorship in psychology at Columbia University.

Professor Raymond Dodge has given a course of eight lectures on "Problems and Methods in Dynamic Psychology" at Columbia University.

Dr. Ernest Mach, formerly professor of the history and theory of the inductive sciences at the University of Vienna, has died at the age of 78 years.

Announcements of the deaths of Gilbert Ballet, M. Koppen, and Nathan Oppenheim have appeared. Ballet wrote "*Le langage interieur*" and was professor of nervous and mental diseases and the pathology of the brain at the University of Paris. Oppenheim was best known for his books on child hygiene and development. Koppen was professor of psychiatry at the University of Berlin.

Dr. Louis B. Bisch has been appointed instructor in psychology for the police department, and Dr. Eugene C. Rowe criminologic examiner, of New York City.

Professor Joseph Jastrow, of the University of Wisconsin, recently gave addresses to the Sigma Xi societies at the University of Indiana, on "The Expression of the Emotions," and at Purdue University, on "The Sources of Human Nature," and delivered the Convocation address at the University of Indiana on "Theory and Practice."

Announcement is made of a prize of $1,000 for the best thesis written by a woman on a scientific subject. Psychology is included among the subjects. The thesis must embody new observations and new conclusions based on independent laboratory research. Theses offered in competition must be in the hands of Dr. Lillian Welsh, Goucher College, Baltimore, Md., before February 25, 1917.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

HEARING

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Köhler (7) gives us this year a lengthy discussion of his present attitude towards the problem of sound analysis. His paper reports few experiments, but many important observations, and contributes considerably towards the clarification of the more or less conflicting results which recent experimental research has brought forth. He now distinguishes "pitch," which involves the musical character of the tone and embraces Révész's "quality,"[1] from the "tone-body." The latter has two important aspects, "brightness," which appears the more fundamental, and "vowel character." It may also take on a "voluminosity," though this aspect is not specifically handled in the present paper.

The first discussion treats of the shifting of pitch in normal and pathological hearing. Révész has shown that in v. Liebermann's case the tone-body (called by him "pitch") is not affected in the paracusic regions. This appears also to be the case in v. Maltzew's observations of normal false-hearing.[2] Köhler observes that when a "u" is determined on the tone variator at 263 vs., if the head be brought nearer to the instrument, and the intensity of the tone thus increased, the "u" shifts to an "m"-like character. In this case both pitch and tone-body are altered.

The second discussion concerns tones without pitch. It is contended that pitch should not be regarded as the essential feature of the acoustic scheme. Both high and low tones lose their pitch while retaining their "body." In regard to the difficulty of obtaining a satisfactory "s" at the optimal vibration frequency of 8,460 vs., the single tone appears too open to imitate the spoken "s." However, with two Galton whistles sounding tones of this region with a frequency whose difference is great enough to eliminate beats a normal vocal "s" is produced.

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[1] See the BULLETIN, 1913, 10, 108.

[2] See the BULLETIN, 1914, 11, 99 ff.

This observation may be correlated with Lord Rayleigh's (11) failure to secure a satisfactory "s" with the single vibration frequency of this number. Rayleigh's attention was called to Köhler's results by Titchener, who reported before the American Philosophical Society experiments which indicated that his observers could not distinguish between an "s" made with the mouth and the whistle note of the above frequency. Rayleigh questions the full quality of the "s" and fancies that suggestion may have had its influence in this regard. At least, his own observations show that while the optimal frequency of the Galton whistle is that indicated by Köhler, that of an organ pipe was not the same. He also remarks that he believes the "s" to contain irregular vibrations of a dominant pitch but including subordinate components which are decidedly graver. No grounds are given to substantiate this conjecture, and it is therefore possible that Köhler's observation, recited above, may furnish the true explanation of the vocalized "s." Köhler's observations also indicate the "s" to be lacking in pitch. A melody hummed on "ss" is quite undetected, he states, by an observer who does not know it in advance or infer it from the rhythm.

Brief tones are also observed to lack pitch. Experimenting with a siren upon which all the openings save a few had been covered, the first sound obtained was the "*trockene Schlag*" described by Mach. This occurs before the pitch is noted, yet the "brightness" or "dullness" of the first sound is clearly heard. It appears that the temporal threshold for brightness, and also for vowel character, is lower than that for pitch. Amusia is of interest in that the amusic need not be deaf to speech, in which, of course, vowel sounds are essential. A case examined by Köhler enabled him to conclude that the pitch phenomena were lacking while tone-body remained to afford all the necessary differentiations of sound needed for ordinary speech. It is also inferred that many animals possess the capacity to discriminate in terms of tone-body, but are not sensitive to pitch. Certain simple consonant intervals, however, such as the octave, fifth and fourth, have so much greater stability than the others that they occur in exotic and primitive forms of music while otherwise differences of brightness or tone-body play the dominant rôle.

A third topic of discussion concerns noise. Sounds above 20,000 vs. are noises, but the limit of hearing is not reached here. In passing from "s" to "f" sounds, Köhler noted that both brightness and volume are altered, the "f" has greater volume and less brightness despite its higher frequency of vibration. It is stated that with the König metallic plate at c^7 one may easily hear beside the shrill "s," also an "f" which is removed by appropriate interference. The conclusion is that noise is usually occasioned by numerous simultaneous tones of unharmonic frequency, and by numerous rapidly following tones of slightly different pitch. It also occurs as a correlate of the highest, lowest and shortest frequencies. In addition, we have the "roughness" effect of beats, and certain explosive sounds ("p," "t," "k," "b," "d," "g") which resist attempts to assign them to any special frequency of vibration. Noise is more a matter of "body" and less a matter of "pitch." But tones and clangs play but a relatively small part in sound. The original and most usual sounds are indeed of noise character. The inference is drawn that tone is an exceptional occurrence finding its correlate in the simplicity of the nervous process aroused. We need assume no separate organ for noise, but should rather regard the cochlear receptor as primarily an organ of noise, while tone is a later refinement of sound corresponding to a specific nervous impulse.

A fourth topic deals with speech and music. It is contended that music plays no important rôle in speech. So-called "speech melodies" contain no pitch other than what we choose to read into them. Speech is a matter of tone-body. The vowel character is not the quality of noise (Jaensch), but one of the aspects of tone-body, as is also brightness. The vowel character is given by the most intensive component, but this need not be the fundamental. Indeed, the fundamental is not necessarily the dominant component of a sound. Low tones on the piano may lose their fundamentals entirely when their partials are removed through interference. The notion is advanced that the partial impulses cooperate in the arousal of the pitch of a clang. The dominant pitch may thus be retained even though the fundamental itself be a very weak component. Combined clangs are usually heard as single sounds. The cochlear membrane responds by relatively large parts, rather than by single resonators in the original Helmholtzian sense. This response is the correlate of the tone-body, while pitch has for its correlate the frequency of nervous impulse. Analysis is unnecessary to determine the pitch of an accord. This is more a physiological than a psychological phenomenon. Ordinarily the highest tone gives the pitch, but not always.

The consciousness of "absolute pitch" is found to be usually dependent upon timbre and similarity of tone-body. It is developed through practice with special instruments, chiefly the piano and violin, which are well adapted for such discriminations since their separate notes vary markedly in timbre. With the tones of the human voice, judgments are much less reliable, because the transitions of timbre are much less clearly defined, the human voice having as many as ten different "registers." Experimental training with the piano, attention being given primarily to the tone-body of different keys, enabled Köhler to improve his capacity for absolute pitch very materially. He was unable, however, to use his acquired ability to judge the pitch of tones on other instruments. Some cases examined indicated a true sense for absolute pitch, in that by inner reproduction of the sound the observers were able to name its place in the scale, but the author believes that the most usual cases depend simply on familiarity with the tone-body of sounds of particular instruments.

Some concluding remarks on terminology aim at the justification of analogical terms for describing the complicated phenomena of hearing. By analogy with the other senses, pitch appears to be an attribute. It is a "*niveau*" rather than a content, and has something of the nature of a spatial point. Brightness and the vowel character, however, belong to the qualities, such as color, smell and taste contents. Nor can we term pitch a specific musical quality for it does not belong to specific tones as such. The transposition of a melody does not alter the relative pitch, but it does affect the quality of the melody. The character of pitch is its localizing capacity. In this it is unlike brightness. If one produce a deep "o" followed quickly by an "a" at the same pitch, the brightness changes but there is no rise in pitch. Whenever the "o" is altered a semi-tone, however, although the brightness changes very little, the change in pitch or localization is very marked.

Modell and Rich (9) have tested Köhler's earlier work on the pitch of vowels, using as sources of sound tone variators, the piston whistle and the Galton whistle. Their results in the main substantiate Köhler. All five observers reported the vowel sounds, though one heard no pure vowels save "a." Some observers tended to place the entire series of vowels at a higher pitch than did others. The octave relation could be made out from the average results between "u," "o" and "a," and between "e" and "i," but hardly between "a" and "e." With three observers Rich (13) has tested the threshold of volume discrimination for tones of the Stern variator ranging from 100 to 6,400 vs. He found that judgments of this sort could be made with ease and great consistency; that they were made on an attributive basis, after practice, as immediately as those of pitch. The relative difference limen approximated .03+. It is thus different from pitch both in magnitude and course, since it indicates a judgment in terms of equal ratios of vibration frequency, rather than of absolute frequency as is the case with pitch. Sizes (14, 15) in two brief reports indicates the objective existence of partials below the fundamental. The details of his experiments are not reported with sufficient fullness to make his results easily comprehended. He notes that inferior harmonics may be easily detected in the tones of gongs and bells.

Hohenemser (6) discusses the problem of concordance and discordance as distinct from that of consonance and dissonance.[3] Riemann has asserted that dissonance is possible only when a third note enters into a binary combination, or is thought of in such a connection. It may therefore be regarded as a phenomenon of perception. The author challenges this. The contradictory cases of the semi-tone and whole-tone dissonances are cited. Reference is also made to Stumpf's distinction, and his controversy with Riemann over the chord c-e-g♯. The author's argument as concerns this chord is the same as that advanced in a different connection by the present writer.[4] The interval c-g♯ is a consonant minor sixth, when e is added it becomes dissonant, although the intervals c-e and e-g♯ are both consonant major thirds. The fact appears to be lost sight of that this chord is an impossibility in just intonation. It is impossible with a single note for g to secure a frequency which produces the relation of 5 : 8 with the lower tone, c, and at the same time the relation 4 : 5 with the middle note e. The chord in tempered intonation is dissonant because this discrepancy is heard. The author maintains that the tempered intervals are always heard as of just intonation. The tempered scale never completely sets aside the difference between the sharping of a note and the flatting of a note above it, even though the same key may serve for both. Hence concordance and discordance have their application in the sense of Riemann and Stumpf only in the tempered scale. In just intonation, concordance rests solely upon intervals whose tones fuse, and is therefore identical with consonance.

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[3] See the review of Stumpf's paper in the Bulletin, 1912, 9, 117 ff.

[4] See the Bulletin, 1911, 8, 95.

Peterson (10) reverts to his theory that combination tones are a product of disturbed superposition of vibrations in the liquids of the inner ear. So-called objective combination tones are also largely subjective in this sense. All arise from the primary tones and certainly not from other difference tones. He cites an experiment upon the summation tone produced by the ratio 2 : 3. The summation tone (5) might be occasioned by the primaries directly, or by the difference of their overtones, 10 : 15. If it were the former, the lowering of one of the primaries one vibration should produce one beat when the summation tone is sounded together with an auxiliary tone 5. If it be derived from the partials there should be five beats. The experiment demonstrated but one beat in such a case. The author finds no evidence that combination tones ever arise from partials, and is therefore inclined to regard them as originating solely in the primaries themselves. Wittmann (16) used a Forchhammer phonoscope with which the fluctuations of a flame set in vibration by tones from a series of Appunn pipes could be objectively determined. (Seashore's tonoscope[5] is a more elaborate instrument based on the same principles.) He was thus able to study the combination tones objectively produced by these means. He finds registered difference tones of the first order and of other orders, below the primaries, above them and between them. Experiments with interference, and the study of beats, which are also optically discernible, indicate the location of these secondary vibrations to be in the membrane of the capsule or in the flame itself, rather than in the tones of the producing instruments or in the air. It is also shown that these combination tones are dependent upon partial components, since they can be reduced or eliminated when the relevant partials are prevented through interference. K. Schaefer's attempt to locate subjective difference tones in the labyrinth is criticized adversely, while Ewald's "sound pictures" are noted as possessing many points of likeness to the flame vibration. It is not claimed that the flame picture is a true analysis of the sound stimuli. The author takes the ground that a physical explanation of such a phenomenon as that of combination tones must always prove inadequate. "Atomic" conceptions of psychological analyses, he thinks, are always erroneous. He is thus content to conclude that for a more or less definite clang sensation a more or less definite "sound picture" upon the basilar membrane suffices as correlate.

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[5] See the BULLETIN, 1915, 12, 165.

Bernfeld (4), aiming to point out the insufficiency of such tests of musical capacity as have been devised by Rupp,[6] discusses two cases of so-called unmusical persons in whom an apparent lack of interest and aversion was found to be coupled with some real musical ability. Psychoanalysis brought to light facts in the childhood of each person which accounted for their respective peculiarities. Heinitz (5) describes some experiments in musical reproduction performed on five persons of varied musical interest and ability. The attempt was made to indicate a method of experimental testing in which with different kinds of presentation—direct sounds and signs, musical notation, letters and numbers—the musical phrase should be reproduced by voice, by whistling, on the piano, violin and flute. The varying difficulties met with by the five subjects are described in detail, but the results proved too complicated to draw therefrom other than methodological conclusions.

Baley (1) studied the discriminability of different tones conducted simultaneously, but separately, to the two ears. A threshold as low as 6–7 vs. difference was demonstrated, though many different stages of judgment could be made out. With three tones, one of them common to both ears, the other two conducted separately to the two ears, a discrimination was possible with a difference of 4 vibrations. Peculiar spatial phenomena were reported in that the different tones were described as possessing differences in localization and "breadth." If the timbre of the tones differs, they are very readily discerned, even when at the same pitch. In a further investigation (2) various numbers of tones, up to ten, at intervals between the fourth and octave, were conducted separately to the two ears. With the practised observers of the Berlin laboratory few mistakes were made in judging correctly the tones of the right as compared with the tones of the left ear. This was true even when the observer was unaware which tones were to be given, or how many to each ear. Experiments with whole-tone intervals proved too difficult, largely because of the confusing presence of beats. The ability to localize seems to be general and immediate, without head movement. Though some errors were made, no indefinite localizations were reported.

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[6] See the Bulletin, 1915, 12, 167.

Marage (8) notes some observations upon soldiers made deaf by the explosion of shells, etc., during battle. A large percentage of these cases showed improvement under treatment with the vowel siren.[7] Cases in which the middle ear is affected without external lesion suggest an analogy to certain forms of congenital deafness in which without parental defect the child is born deaf as a result of a shock which the mother sustained during the period of gestation. Bachrach (3) has attempted to test auditory acuity at different times of the day. The source of sound was a tone of 1,175 vs. produced by an organ pipe actuated by a wind chest. The sound was conducted to a telephone and its intensity measured by a microphone. The tones were received in a relatively quiet room. The results show no striking difference, save that the threshold appears to be slightly lowered towards 6 p.m. The author states in another connection that the observation room was less quiet at this hour than at others, owing to a greater amount of disturbance in the streets. We may therefore question if the somewhat greater effort required at this hour may not have been the real occasion for the increase in acuity, rather than the time of day or the general physiological conditions which attend it. Rich (12) has demonstrated that the frequency of vibrations in whistles and variators is altered appreciably with change of temperature. It varies, for instance, from .18 vs. for 100 vibration tones to 90 vs. for 50,000 vibration tones with an alteration of 1° C. in temperature. In calibrating such instruments temperature must accordingly be taken into account. To be comparable, the calibrations at different settings must be reduced to a standard temperature. The temperature at which the comparison is made need not be considered since both instruments vary to the same amount, but the results are valid only for the temperature at which the standard was calibrated unless a correction is made. In calibrating by Kundt's method the same holds true. Formulæ are given for performing the various corrections.

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[7] See the Bulletin, 1911, 8, 98.

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AFFECTIVE PHENOMENA—DESCRIPTIVE AND THEORETICAL

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A few of the titles included in this report belong to a somewhat earlier period, but came to the attention of the writer too late to be noticed last year. The one work of outstanding importance in the year's publications in this field is Cannon's (2) admirably lucid account of his investigations on the bodily changes in pain, hunger, fear and rage. The results of these investigations, which deal with the diffused activities of the sympathetic nervous system, and especially with the excitement of the adrenals, are now fairly familiar. It is shown that in the phenomena studied there is increase of adrenin and that this calls forth carbohydrate from the liver, thus flooding the blood with sugar, helps to distribute blood to heart, lungs, central nervous system and limbs, abolishes quickly the effects of fatigue and renders the blood more rapidly coagulable, all these being effects which are useful. It is further noted, as bearing on the general theory of emotion, that the effects are similar in intense joy, sorrow and disgust; hence it is concluded that the source of emotional differences is to be sought in other than visceral factors, which seem merely to contribute to an emotional complex feelings of disturbance in organs of which we are not usually conscious. Titchener (16) cites this result as adverse to the James theory. The theory is right in this, that all emotions have an instinctive basis and are characterized by organic commotion, but organic commotion is neither constitutive nor differential; rather, all the component processes—perception, ideas, kinæsthesis, organic sensations, feeling—play their part in the total experience. From the simple feelings of pleasantness and unpleasantness Titchener distinguishes sense-feelings, that is, blends of feeling and sensation, especially kinæsthetic and organic sensation, and to these he reckons the Wundtian "dimensions." Dunlap (6), writing against epistemological dualism and holding that introspection discovers only objects commonly called physical, maintains that feelings are themselves corporeal and that emotion is made up of bodily processes including feeling. "The trembling *is* the fear." The view that emotions are instinctive reactions representing ancestral acts is developed by Crile (4), especially in connection with clinical and experimental studies of fear; while Harvey (10), dealing more with the hypothetical mechanics of the process, advances the theory that feeling is the concomitant of the resistance to the passage of a nervous current in a nervous arc. The two works last mentioned have been treated in special reviews.[1]

Other contributions deal with characterized affective states. Hall (8), charging the Freudians with being *doctrinaire* and believing that the movement inaugurated by Freud has a far larger field than that of sex, seeks to show that the Freudian mechanism of impulsions and repressions, of *Verschiebung* and sublimation, of dreams and reveries, apply as well to anger as to sex, and thinks that still better illustrations might be found in fear and sympathy. Williams (18) suggests analysis in the treatment of fear, but his most interesting case is that of a girl of sixteen who was apparently cured of nocturnal fears, not by analysis, but by a course of reading on the subject and study of her own feelings. The sentiments and beliefs associated with death are treated by Hall (9) in a long and discursive paper which draws freely for its material on anthropology, the questionnaire, philosophical speculation and a lively imagination. One of its many theses is that the fear of death in children is a striking case of recapitulation. As to immortality, the belief in it in the old sense has pragmatic value, but all doctrines of another life are but symbols and tropes of the earthly superman. "The story will not be continued in a future number, but completed in this." Schumkoff (13) whose work originally published in a Russian medical journal is known to the writer only at second hand, holds that anxiety, generally regarded as a kind of fear, is really an "autonomous" emotional state with its own peculiar symptoms. Among them are the following: preoccupation with the object of apprehension, about which, however, there is persistent doubt, unsteady flow of thought, variable and for the most part disagreeable emotion, increased suggestibility, irregular motor activity, restricted respiration, heightened temperature, increased thirst, diminished appetite, light and dream-disturbed sleep. Dupuis (7), developing a view already reported in these pages, argues that timidity, also allied to fear, is not, as sometimes represented, a phenomenon of hyper-emotivity, but of psychasthenia, namely, deficiency in the power to actualize the energy demanded by the situation. He finds in this the explanation of its two fundamental characteristics, slowness of motor organization, for which he presents new evidence, and social apraxia. Shame is held by Smith (15) to be a derivative of the more fundamental emotions of fear and disgust, developed through the reciprocal action of the environment on the consciousness of self. Bliss (1) proposes a theory of laughter akin to that of Freud in his paper on wit, the assumption being that in the paroxysms of nerve and muscle which release the tension there is manifestation of repressed natural instincts. Laughter, accordingly, springs not from what is superior in man, but from that in him which civilization tends to suppress, but which is in latent sympathy with the thing portrayed. The author tests the theory, which seems to have much in its favor, by applying it, but, some of her cases appear as refractory as cases usually do when the attempt is made to explain the comic by one single principle.

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[1] Psychol. Bulletin, 1915, 12, 430, 424.

The nature of interest is still a moot question. The "intellectualistic" theory of it is now generally discredited, but is it fundamentally an emotion? Some recent writers find in it an expression of biologically conditioned instincts. Cellerier (3) seeks to elucidate the subject from observation of its manifestation in children chasing butterflies. His analysis discovers three essential phases in the complex phenomenon—perception, or representation, of an object, memory that this object has formerly served, for the satisfaction of a tendency, and immediate fixation of attention on the object. The memory and the affective tendencies to satisfaction are held to be generally subconscious or unconscious. The inclusion of memory as an essential seems to make all interest derived.

Dugas (5) and Weber (17) adduce fresh evidence in favor of affective memory. Dugas appeals to the testimony of Stendahl, a writer famous for the richness of his emotional life combined with subtle power of self-analysis; he has been called, indeed, the greatest psychologist of the nineteenth century. Stendahl in his autobiography records many cases of remembered feelings with almost entire absence of representative images, and he held such affective memory to be the more pure and trustworthy the less it is interfered with by images that complicate, falsify or supplement it. Weber cites from his own experience cases where affective remembrance preceded the intellectual, referring particularly to states arising involuntarily and unexpectedly on occasion of a concordant milieu and explicable only as revivals of juvenile cœnæsthesia. The affective character of these experiences is due, he thinks, to the intercalation in present cœnæsthesia of a momentary return of a former rhythm of visceral sensibility. This conception may serve, perhaps, to mediate between extreme views on both sides of the controversy.

Segond (14) writes of the dialectic of irony and enthusiasm, for the "enigmatic unity" of which he creates a kind of feeling by various rhetorical devices and by numerous illustrations from art and life. The article is rich in suggestion, but does not readily lend itself to analysis. The main thesis seems to be that from the original union of the two contraries "proceeds the moving and mysterious tragedy of existence and of passion."

Except as experienced facts psychology, as such, deals no more in values than do other empirical sciences. Accordingly a classification of the feelings as "higher" and "lower," such as Kröger (11) attempts from an ethical point of view, can have here only a subordinate interest. It nevertheless has psychological bearings, though these are not a little obscured by the peculiar sense given to many of the conceptions by the author's metaphysics. Into this we cannot enter. He first divides into sense-feelings and thought-feelings. To the distinction between the world within the body, including the "spiritual" self, and the world without, actual or imagined, corresponds the distinction between egoistic and idealistic (altruistic) feelings. Ideal feeling rests on sympathy. Sense-feelings are lowest in the scale, then follow egoistic thought-feelings, then in order moral, nature and religious feelings. Religious feeling is concerned only with the incomprehensible unitary Being of the world. So-called æsthetic feeling belongs in part wholly to sense-feeling; in its idealistic form it belongs to nature-feeling. The scientist's feeling for truth belongs to the lower egoistic feelings save as it acquires a moral and religious tone. All feeling is essentially feeling of freedom, and in the higher feeling of freedom is the ethical ideal. Mention of the work of Rashdall (12) in this connection would be still less appropriate but for the opportunity it affords to warn the reader that the question propounded in the main title is not considered in a psychological sense in the text at all. The book, in fact, is a defence of rationalistic ethics against on the one hand writers like Westermarck and McDougall, who derive our present moral judgments from primitive instincts and sentiments, and on the other writers like James, who identify good with the satisfaction of desire.

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AFFECTIVE PHENOMENA—EXPERIMENTAL

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Altogether the most elaborate work of the year is Cannon's book (2) in which he brings together his experimental studies of the influence of pain, fear, and rage upon adrenal secretions and reactions in the viscera. This book will be given a separate review and need not be summarized here.

A volume on the *Origin and Nature of the Emotions* by Dr. Crile (3) is of much less scientific value. It is a collection of eight addresses which Dr. Crile has delivered at various times and places. Highly important facts which Dr. Crile has gathered from his surgical experience are mixed with poorly worked out interpretations. He expands at great length on the conception, like that of Darwin, that the emotions are "primitive instinctive reactions which represent ancestral acts." These acts are controlled by the law of "phylogenetic association," and they become emotions when physical action is prevented. He seems to think that these phylogenetic associations have been built up by the fact that every experience of the race has been retained. "The phylogenetic origin of fear is injury." "In the abdominal viscera, as in the superficial parts, nociceptors have presumably been developed by specific harmful influences." The origin of adaptations has been determined by the presence in the environment of the race of stimuli which created a need for such adaptations. In this way "brain patterns" are evolved, each pattern being adapted for a definite action. These patterns are a recapitulation of the experience of the race. One is surprised to find so little appreciation of the biological problems of variation and selection. It is in line with this type of interpretation to find that "the fundamental instincts of all living matter are self-preservation and the propagation of the species." Pain is said to be associated with discharge of energy from the brain cells, such that, "equal and simultaneous stimulation of all parts of the body leaves the brain cells in a state of equilibrium," no brain cell changes occur, and there is no sensation of pain. Contrary to Cannon, physical trauma is found not to cause increased adrenalin in the blood. Excitement is supposed to cause secretion of adrenalin and otherwise mobilize "kinetic energy," which products of stimulation must either be utilized or eliminated as waste products. Laughter and crying are explained as muscular exertion by a set of muscles that can be spared without interfering with maintenance of posture, which muscular action serves to use up the mobilized energy, and prevent its injurious effect upon the organism. One wishes the author would attempt a digest of the literature on the basis of such an interpretation.

Dr. Crile finds that physiological exhaustion of surgical shock and pathological changes in the nerve cells of the cerebrum are caused by trauma under inhalation anæsthesia, while these phenomena do not occur when the nerve paths between the injured region and the brain are blocked by cocain. He explains that the injury causes discharge of nervous energy from the cells by the law of "phylogenetic association" and consequently the exhaustion and cell changes. One might accept the facts as given and still find an explanation more in line with other physiological facts and without the obvious difficulties of Dr. Crile's theory.

In Downey's (4) experiments, subjects were asked to classify twenty-four fragments of poetry into eight groups according to preference. This was done at five different sittings. They were also asked to grade the fragments on the basis of vividness of emotional reaction, according to the vividness with which the reagent projected himself into the content, with reference to the nature of inner speech, and according to vividness of concrete imagery aroused. Later the fragments were grouped according to beauty. Familiarity with the material on account of repeated classification brought about a growing agreement among the subjects, and the final classification on the basis of preference approached that made on the basis of beauty. Rich content, both emotional and imaginal, contributed to preference, the relative importance varying with the subject.

Kellogg (6) investigated interference of feelings by exposing two pictures alternately in a modified form of the Dodge tachistoscope. By means of a revolving disk the periods of illumination of the two pictures could be alternated at different known rates. The supposition was that the tendency of feelings to persist would lead to interference of some sort. Careful introspections were taken to trace the cause of feelings and to describe them, and these introspections are quoted in detail in the monograph. Algebraic summation of feelings was seldom found. "Displeasure may inhibit displeasure rather than add to it." If the feeling-tendencies are of like intensity, and the apperceptive attitudes are dissimilar, "the result is inhibition, whether the feeling tendencies are of the same or of unlike sign." Fusion may occur with an apperceptive synthesis of the stimuli; mixed feelings are sometimes found. "When the fields of appeal become nearly identical, the feelings either become one, or 'increase by contrast,' in alternation, according as they are of like or of opposite value. Parallelism does not occur with feelings of unlike sign when the general attitudes are the same. When the feelings are of unequal intensity, inhibition continues farther up the scale of similarity. In some cases a strong feeling persists without inhibiting a weak feeling, during the exposure of the stimulus which gives rise to the latter. The weak feeling is, as a rule, broken off with the appearance of the other stimulus." Excitement and calm gave results similar to pleasure and displeasure.

The origin of shame, according to Smith (8), is in the social consciousness rather than in any biological facts. No cases of shame were found in children under two years of age, and the occasion with children was directly related to the environment, as muddy or torn clothes, sores on the face, etc. The moral aspect was obscure. Fear, disgust and violations of æsthetic feeling, as well as modesty, probably contribute to the development of the emotion.

Miss Washburn and her students (1) investigated affective sensitiveness for Bradley colored papers, nonsense syllables consisting of an initial vowel and a final consonant, and intervals and chords struck on a piano. The inverse measure of affective sensitiveness is the number of indifferent judgments in a series divided by the number of very pleasant judgments plus the number of very unpleasant judgments. For each material, the observers were arranged in order of affective sensitiveness, and rank-difference coefficients of correlation were found. The correlation between colors and syllables was highest, that between syllables and tones next, and that between tones and colors lowest. Affective sensitiveness to tones and colors was nearly the same, that to articulate sounds was much less. Affective sensitiveness to colors tends to decrease with the ennui produced by a long series (7), and this tendency is somewhat more marked with those observers who reported being conscious of ennui than with those who reported continuous interest.

With the exception of vowel sounds, which have more tone quality (5), the elements of articulate sounds derive their pleasant or unpleasant character from association with meanings, or with kinæsthetic appreciation of the ease or difficulty of the articulatory movements. Associations with meanings contribute more to pleasantness than to unpleasantness. Pleasantness or unpleasantness from suggested ease or difficulty of articulation are more likely to be of moderate than of extreme degree; judgments of extreme degree are likely to be due to association with meanings.

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ATTENTION AND INTEREST

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Loreta (1) gives a summary of the theories and present status of attention, with the conclusion that attention is a unitary process, the expression of the man as a whole and of all of the forces that have acted upon him. Interest is not a force in itself but is merely an expression of attention and of the conditions that develop attention. It follows from these statements that training attention means nothing more or less than training the individual and training the will. A few general practical suggestions are given, such as that concrete and illustrative material shall be used as much as possible and that the hygiene of the child shall be considered. The article is a brief summary of our general knowledge of attention.

Woodrow (2) continues his series of studies on measuring attention by investigating the time of reaction to surfaces with sharp outlines, with and without the detraction produced by a warning signal given at irregular intervals. It was found that the effect of the irregular intervals in increasing the reaction time was less when the outline of a square was used as a stimulus than when a spot of light with no definite outline but of the same intensity was the stimulus. Using the law that the detraction is greater with stronger attention than with weaker this confirms the statement that outline increases the likelihood of attracting attention. This also agrees with the introspective results obtained by Meads in the Cornell laboratory and with the introspection of the observers who took part in these experiments. The results serve as one more indication of the value of the method as well as a confirmation of the introspective results.

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TIME AND RHYTHM

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It is a significant fact that experimental work on the perception of time and of rhythm has nearly ceased. One research on time, a statistical study of speech rhythm and a minor study on rhythm effects are all that have appeared in the last two years.

Kahnt (3) has continued the line of work on the estimation of time-intervals which has for so long been associated with Wundt's laboratory. For 16 standard intervals ranging from 230 σ to 3,850 σ he found evidence of a periodic variation in the constant error: the shortest standard was underestimated, the standards from 300 to 680 less underestimated or overestimated, and the standards beyond 800 again underestimated. Kahnt introduced an important change in the method, by which the observer by depressing a key released the mechanism which automatically presented the standard interval, and by a second depression again released the mechanism to present the variable interval. Thus the conditions of movement and attention were the same for both intervals, each beginning exactly when the observer was ready for it. The tables show a tendency for each observer to make a pause between intervals fairly constant, regardless of the interval lengths; the pauses for different observers differing considerably.

Gropp (2) presents the results of a statistical study of the frequency and distribution of stressed and unstressed syllables in portions of prose texts by Schleiermacher and by Hülsen, following Marbe's methods. One of the results is the showing that non-statistical estimates of the rhythmic character of prose have little value. Fifty per cent. of the sequences in the prose selected were found to be of one, two, or three unstressed syllables between successive stressed syllables.

Adams (1) reports the results of some class experiments in immediate memory for groups of nine digits, read at the rate of ninety to one hundred per minute, in five rhythms, and also without accent. The iambic rhythm gave results slightly better than the non-rhythmic reading, and the trochaic slightly poorer. Dactylic, anapestic, and amphibrachic rhythms gave better results than the iambic. Men did better with the dactyls, women with the anapests.

Russell (6) develops a relational theory of time on the assumptions that the distinctions of past, present, and future depend upon experience, *i.e.*, the relation of objects to subject; but that relations of succession and coëxistence are merely relations of object to object, independent of experience. McGilvary (5) discusses the nature of the time-continuum with especial reference to the reality and value of the present. Kirschmann (4) explains motion as the union of change, which is purely objective, with continuity, which is purely subjective. Verrier (9) gives a brief schematic statement of possible variations in the intensity of rhythmic series —crescendoes, diminuendoes, etc.

Shotwell's installments (8) are anthropological, dealing with the evolution of the calendar, superstitions regarding times and seasons, the development of astronomical reckoning, etc.

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CORRELATION

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Interpretation of Correlation.—Webb (35) believes that he has discovered another general cause of correlation among mental processes which should be added to the general intellective factor of Hart and Spearman. His new factor is conative in character and is described by its advocate as "persistence of motives." To determine its generality he uses Spearman's criterion that the correlation of columns of coefficients must approach 1.00. Webb's intercolumn correlations average .94 with a selected table of partial coefficients, after eliminating the general intellective factor. In preparing his table of coefficients he chooses those traits of character which show the largest difference in their correlations with "profoundness" and "quickness." Whether or not his factor is completely general, it seems as if his method might be utilized in empirically discovering common factors. The large mass of correlation data on careful estimates of nearly fifty different personal traits for a group of boys and a group of men, their intercorrelations and evaluation for the general intellective factor makes this one of the most important quantitative investigations of personality which has been attempted. It will be reviewed separately in the Bulletin.

Building on Spearman's theory of a general and specific factors, Carey (7) makes the first systematic attempt to determine the nature of specific factors. Important conclusions as to the generality of discrimination and memory are reached by tests on sensory discrimination, sensory memory, verbal memory, general intelligence, and by other data. No common activity of the nature of sensory discrimination is found after eliminating the general factor. Any specific factor of this type is of the nature of content. There appears to be a small general memory factor as well as a common factor of content in memorizing. Painstaking is not as general a factor as has been supposed. On the whole specific factors are probably numerous. They can be of the nature of act or of content. All except the motor factor are very limited in range. If the general factor is admitted, he finds support for Thorndike's earlier view of the specific nature of mental processes, and of Sleight's results. Kelley (19) gives the best evidence as to the existence and continuous effect of specific factors when he shows that the abilities which differentiate success in English from success in mathematics persist from the elementary school to high school, the *differences* in the marks correlating .515.

The general common factor is confirmed by Webb (35) and Giese (12), while Damm (9) concludes from his study of sensory discrimination limens that the central factor is the span of attention. Moore (23) issues a warning against assuming that the correlation coefficient always is the best measure of the relationship between two variables even when they show normal correlation. He provides a formula which exhibits r as a function of the underlying variable quantities that determine x and y and the relationship between them.

The interpretation of correlation through heredity is discussed by several investigators. Considering the suggestion of Brown that the general factor might be environmental, like family discipline, Spearman (32) argues that it would then affect a part and not the whole of the correlations. If part of the correlations were affected by such an environmental factor and part by innate ability then two such diverse causes would not give the correlations of correlations approaching 1.00, which he finds. The general common factor is innate, but the development of specific factors is unquestionably influenced by environment. He also makes the interesting suggestion that correlations between siblings may not fully express the hereditary relationship because of important pre-natal causes of individual differences, suggested by the work of Johannsen. Peters (27) traces family resemblances in school marks for three generations, and sibling correlations with a few tests. Unfortunately his frequent use of Yule's "Q" for calculating correlations mars his results. Pearson's four-fold coefficient, however, gives a coefficient of .37 between parents and children for average marks and .42 for siblings, .46 for brothers and .62 for sisters. There must be some alternate inheritance since relatively more children get the middle mark when both parents had this mark than when one had better and the other had worse marks than this. The points indicating the chief importance of heredity are: The facts of alternating inheritance; the different resemblance between parents and children in different school subjects, the child tending to follow one parent in all subjects; the influence of sex upon resemblance, the mother having a stronger influence than the father, the grandfather than the grandmother; the closer resemblance of siblings of about the same age, those of wider differences in age having their resemblance reduced by the influence of maturity; the influence of grandparents in cases not influenced by parents. He finds support for the Mendelian principles of inheritance and Galton's law of filial regression. Further argument for heredity is found (33) when those siblings at corresponding ages who have been longer under the varied training of an institution show no less resemblance than those under a common home influence. Work with the Stanford measuring scale (34) shows that the correlation of intelligence with social status decreases with the older children and longer environmental influence.

Method.—The contributions to method include papers by Pearson (24) and Isserlis (18) developing and illustrating formulae for partial and multiple correlation ratios. Ritchie-Scott (29) makes the variate difference correlation method more useful by a table for facilitating the calculation of its error. There are also papers on the reliability of the coefficient of mean square contingency (25) and the correlation coefficient (11). Damm (9) shows that the two values of the correlation ratio may differ as much as .42, so that it is hardly safe to use either one alone, as has been advised. He finds that the Pearson formula for transposing coefficients obtained by correlating ranks gives only one tenth of the correction empirically discovered with his data by actually using both methods. He also finds that Spearman's earlier formula for eliminating errors of observation is faulty when tested by Brown's criterion. Spearman (32) shows the method by which one can measure the strength of the general factor in a particular individual. He believes the general factor admits "to a large extent in practice of as definite measurement as the length of the arm or the circumference of the head."

New Applications.—The partial regression equation is applied extensively in the field of applied psychology for the first time by Kelley (19). He sets a model for scientific work in vocational guidance by showing how it is possible to predict scholastic success in high school on the basis of grammar-school marks, estimates of elementary-school teachers, or tests. His quantitative analysis of the correlates of scholastic success enables him to make such a statement as the following before the student begins his high-school classes: Student No. 157 is most likely to be 1.070 times the standard deviation above the mean mark in the high-school class in algebra, +.563 S.D. in English and +.552 S.D. in history. With a group of 33, for whom all three forms of data were available, the prediction correlated with success in general scholarship in the first year of high school as high as .89. The partial regression equation enables the investigator to give the parts of a test, separate tests, or different forms of data each their proper weight in a prediction. For example the bearing upon average class standing of estimates of intellectual ability, conscientiousness, interest, and oral expression are weighted as 8 : 4 : 2 : 1. Kelley also uses Brown's method of stating reliability in addition to the usual reliability coefficient. Gray (13) applies the partial regression equation to weighting the various factors on a score card for handwriting. Thus weighted, the factors for size, neatness and spacing of letters show considerable variation from the estimate of competent judges as to the relative influence of these factors in general merit. Short methods for extending a regression weighting beyond four factors promises to raise some difficult problems. Pearson and Jaederholm (26) by use of the regression coefficient find that the average correction for the Binet-Simon scale to be added to each mental age from 7 to 14 years is .0953 × chronological age —.7769. The regression is linear and a year's growth in intelligence is found to be a valid unit of measurement at these ages.

Correlation is recognized as affording the best approach to an empirical analysis and classification of personal traits. In an intensive study Damm (9) makes this analysis on the basis of exact laboratory experiments on the difference limens for the discrimination of intensities of sounds, saturation of colors, visual and cutaneous space percepts. The results differentiate his subjects into groups, one of which shows similar memory performances by high correlation of their individual variabilities in judgment, another showing one-sided memory performances in the different fields, and a third mixed group. There seems to be no correlation between the constant errors of the subjects in the different fields, and only medium correlation for their individual variabilities. Giese (12) looks for sex differences in correlations and finds that they are pronounced. Men have higher coefficients, which corroborates the idea that the male type is more variable. The biological laboratory through Harris (14) contributes an important study by the correlation of steadiness and accuracy of judgment for three observers making over 15,000 estimates of the number of beans in moderately large samples. The personal equation, shown by the constant error, seems to be remarkably little influenced by experience while the steadiness of the judgment increases with practice.

The correlations between the general merit of teachers and 45 different qualities estimated by school officers shows, according to Boyce (5), that the qualities most closely correlated with general merit represent results and technique of teaching, while those least correlated were professional and academic preparation, physical health and voice. Whiting (36) finds that while temperature, pulse and respiration have no diagnostic value for mentality, the last two show so little correlation with age, environment or occupation as to make them serve as possible supplements for finger prints as methods of identification. The Stanford revision of the Binet-Simon scale (34) correlates .40 with social status, and .45 with school success. Winch (37) finds the correlation of spelling abilities of equivalent groups was reduced from .99 to .65 by teaching them spelling by different methods. The direct method proved better. Houser (17) finds spelling correlates better with intelligence than does meaning of vocabularies.

Other Applications.—Illustrating the increasing use of correlation in testing tests, Chapman (8) and Hollingworth (16) investigate the important relation between initial scores and scores after practice. For the effects of practice see also Harris (14) and Damm (9). Giese (12) finds that combinations of tests present uncertain intercorrelations which tend to be reduced in amount. Of 24 intercorrelations over .70 none were for combined tests. The average of teachers' estimates of the difficulty of words for spelling correlates .79 with the empirically discovered order of difficulty, according to Buckingham (6); but there are wide variations so that one-fourth of the teachers judged that word easiest or next to the easiest which was the hardest. Downey (10) finds judgments of mirror script are specialized. While the opposites test and color naming show a high correlation with articulation time, their relation to each other is not all explained by this articulation time, as is shown by the partial correlation with Hollingworth's data (15). Tests give reliable estimates of scholastic ability, but Kelley (19) finds that his tests were of less value than combined school marks for a number of years or combined teachers' estimates. Römer (30) finds that individual reactions with the free association test are a legitimate criterion of intellectual development. It is important to know for the first time that mental tests given a year apart to the same group correlate .71, as is shown by Woolley (38). The relation between manual and mental tests is low, .33 at 15 years. Chapman (8) finds practically no relation between the improvabilities of college students in five different tests. With only a few samples arranged in an order of merit, Adams (1) finds that this method is not adequate for testing the business value of advertisements.

The relationship of school marks has been studied by a number of investigators. Bobertag (4) traces the records of 53 pupils for nine years showing the intercorrelations of 11 school studies. German, the native language, shows on the whole the highest correlation with total marks, .90. Both he and Margis (22) point out the difficulties in using school marks for studying relationships of abilities. For example, when the first three years are combined, mathematics shows the highest intercorrelations, and for the last years in the Realgymnasium it is the lowest. Kelley (20) finds no greater break in marks from senior high school to university than between college years. Rietz (28) shows that the correlation between mathematics and law amounts to .528. Schüssler (31) finds low correlations between school marks for mathematics and singing for two different groups of a thousand pupils each. Correlations of the Courtis-test results for simple arithmetical operations are shown by Baldwin (2) and Bell (3) to be about .40. Bell finds little relation between the speed and accuracy indices. Lyon (21) makes an important distinction in that quickness of learning is correlated positively with recall, .5 to .6, but not with per cent. of time saved in relearning.

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PSYCHOPHYSICAL MEASUREMENT METHODS

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It is obviously of the greatest possible interest to obtain a single expression which expresses the course of the psychometric functions with equal accuracy for all individuals and for all possible experimental conditions. The number of influences which affect the curves of these functions is so great that it is doubtful if such an expression may ever be obtained. Such an expression would be obviously in the nature of an hypothesis about the psychometric functions, and hence its accuracy must be tested by actual experience. The Lagrange and Newtonian formulæ and Brunn's Φ series suggest themselves but are too difficult to be used in actual practice. One must content one's self with an expression whose deviations from the observed values hold between known limits, and one must find the simplest function which expresses the observed results with given accuracy. Urban (24) develops a novel method of interpolation which might also be profitably used in all kinds of statistical work. The calculations are made on the basis of the data obtained from seven subjects in the author's former study in lifted weights. It turns out that for the presentation of the psychometric functions of the lesser judgments fewer members are required than for the greater judgments. For the lesser judgments, expressions of the third grade are sufficient for but two subjects; while for all but one subject, a member of the fourth grade is necessary to express the greater judgments. The necessity to regard higher powers than those of third grade demonstrates the existence of disturbing influences that are noticeably stronger for the extreme stimuli. One has to conclude that the judgment of great differences between standard and comparison stimuli are not made under the same conditions as those of smaller differences. But these results show that this influence is less strongly present for the less judgments than for the other categories. The values of the coefficients obtained for the seven different subjects are very similar, the values in each column having the same sign and being of approximately the same magnitude. Hence the determination of the course of the psychometric functions for different subjects turns out to be approximately the same, provided the conditions of experiment are similar. The maximum and minimum values of the curves for each category of judgment and for every subject are calculated. The similarity of these values for the different subjects is astonishing, and this is particularly true for the values of the less judgment. But as these values are within the extremes of the comparison stimuli employed, we have another argument against the employment of stimuli which have large differences. The graphic representation of the average values for all of the subjects gives curves which show a regular course of increase and decrease interrupted only at their extreme ends. A comparison is made of the maximum of the curve of the psychometric functions of the equality cases with the point of intersection of the curves for the two extreme judgments. The author finds that the value of the maximum of the curve for the equality cases does not bear any determined relation to the limits of the interval of uncertainty. This magnitude moves about considerably and for one subject lies entirely outside of the interval of uncertainty. The movements of the magnitude which represents the point of intersection of the curves for the two extreme judgments are much smaller and hence the author concludes that this latter value is a more proper definition of the point of subjective equality. This value is found to be very close indeed to the middle of the interval of uncertainty. The author points out the relation of these calculations to the $\Phi(\gamma)$ Hypothesis.

Urban,[1] in a former paper, had tested the accuracy of four processes of calculation for obtaining the threshold values. The criterion of accuracy of the truest means of determination of the threshold point is that process of calculating which will give the least probable error. Urban calculated these probable errors for four processes of calculation and found that the Lagrange Interpolation Formula gave the most accurate results; then, in order of accuracy, the Limiting Process, the $\Phi(\gamma)$ Hypothesis, and finally, the Arctan Hypothesis. Thomson[2] has already shown that Urban's calculation of the probable errors of the limiting process are incorrect. Thomson (20) now finds certain errors in Urban's calculation of the probable errors for the $\Phi(\gamma)$ Hypothesis as well. Urban's error, according to the author, was in considering h and S to be independent variables, while as a matter of fact, they are exceedingly dependent. The author gives corrected formulæ and recalculates some of Urban's data, obtaining exceedingly smaller values for the probable error of this process of calculation—in one case 0.151 as against 9.477 obtained by Urban. Hence the author believes that the $\Phi(\gamma)$ Hypothesis is quite able to compete with the other processes of calculation and indeed, a complete recalculation may prove it to be the most accurate.

Urban (23) considers certain of the tables published by Bauch[3] in his investigation of the estimation of spatial extents and the problem of our preference for certain numerals. These tables contain the frequencies of estimations of equality for divisions of tenth millimeters and for different extents for the standard stimulus.

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[1] F. M. Urban, "Die psychophysischen Massmethoden als Grundlagen empirischer Messungen," *Arch. f. d. ges. Psychol.*, 1909, **15**, 261–355; **16**, 168–227.

[2] G. H. Thomson, "The Probable Error of Urban's Formula," *Brit. J. of Psychol.*, 1913, **5**, 217–222.

[3] M. Bauch, "Psychologische Untersuchungen über Beobachtungsfehler," *Fortsch. d. Psychol.*, 1913, **1**, 169–226.

From the assumption that an absolute estimation of equality is not a single and isolated process but that it is intimately bound up with the difference judgments Urban develops his treatment of the results. An estimation of equal on the next lower standard stimulus may be considered as a lesser judgment for any given standard; and similarly, an equal estimation on the stimulus next larger may be considered as a greater judgment for any given standard. Inasmuch as the standards employed were equidistant, the author is able to obtain a successive series of observed relative frequencies of difference judgments of the three usual categories for each of the different standard stimuli, and so can calculate the constants for the psychometric functions in the usual manner. On the basis of such treatment, it turns out that the different tenths are perceived with a very different degree of accuracy as measured by the size of the interval of uncertainty. Also it turns out that the constant error of estimation differs for different parts of the series, showing an overestimation for the lower values and an underestimation for the upper values. It also appears that the values of the point of subjective equality obtained through the calculations in accordance with the method of constant stimuli are almost identical with the average estimations obtained directly. The author also outlines a method of graphic representation of results of this sort which takes the form of outlines of different levels such as are found in altitude maps. Values of correlation also lend themselves to this form of graphic representation.

Herfurth (11) studies the effect upon the point of subjective equality by changing the position of the standard and comparison stimuli. Employing visual extents in the particular forms of the horizontal-vertical illusion, the author determined, by the method of constant stimuli, the point of subjective equality with the standard stimulus in the two positions. The author calculates the following values for comparison: (1) the arithmetic mean of the three categories; (2) the central value of the equality cases; (3) the point of subjective equality according to Müller's formula; (4) and according to Urban's formula; (5) the arithmetic mean of the equality cases; and (6) the scattering of the equality cases. The correspondence of the values of the points of subjective equality for all of these forms of calculation correspond very closely indeed. It is found, however, that the order of closeness is in the order we have given. For example, in the first case, 80 per cent. of the readings show a difference of less than 1 mm. or 1/150th of the length of the standard line. The author also finds that progressive practice involves an increasing validity of the place of correspondence and that increasing practice does not change the order of the six values calculated. An opposed relation is found between the average error and the scattering of the equality judgments.

Urban (22) tests out Wirth's formulæ for the calculation of the thresholds upon the empirical data of Keller's acoustical experiments. These formulæ are

$$r_u = E_u + i\Sigma k - \frac{i}{2} \text{ and } r_0 = E_0 - i\Sigma g + \frac{i}{2};$$

in which r_u and r_0 represent the lower and upper thresholds, E_u and E_0 mark the limits upon which an extreme judgment will be given with a relative frequency of one; i is the interval between the equidistant stimuli, k and g represent the relative frequencies of the judgments less and greater. After testing out the accuracy of these formulæ by calculating the probable error, the author compares the results given by their use, with the results from the same materials calculated in accordance with the $\Phi(\gamma)$ Hypothesis. The comparison of values show surprisingly small differences. Hence the use of these formulæ is justified and is advantageous as the calculations are short and show a simplicity that leaves nothing to be desired. Their usefulness, however, is limited by the facts that they demand the employment of equidistant stimuli as well as a series of comparison stimuli extended enough so that the extreme values will yield a relative frequency for the extreme judgments of unity.

The effect of distractions upon the formation of judgments in lifted weight experiments was investigated by Mitchell (16). He employed the strictest form of experimental arrangement and the form of calculations for the method of constant stimuli as advocated by Urban. Two sorts of distractions were employed: (1) a continuous sound stimulus was present during the entire lifting of the standard or comparison stimulus (2) the subject was required to count a series of disparate clicks from one to six, initiated by the lifting of the standard or comparison stimulus. The experimental arrangement for the starting of the sound distractions was very ingenious. Each distraction series was mingled with a normal series of stimuli so that, inasmuch as the results of the two series were taken simultaneously, they are directly comparable. The results show that the coefficients of precision, the h's of the curves of the psychometric functions, are greater for the distraction series than they are for the series in which no distractions were given. Also it turns out that the interval of uncertainty is smaller on the average for the series in which the distracting sound was given than it is for the normal series. The point of subjective equality shows on the average a tendency to be lower in the distraction series. By no means the least interesting result of this investigation is the fact that the curves for the psychometric functions for the series with a simple sound distraction and those in which the subject was forced to count a series of disparate clicks, turn out to be almost identical. The author uses this as the basis for an argument against the existing differentiations of voluntary and non-voluntary attention.

Woodworth (25) summarizes the work of Professor Cattell in the field of psychophysics. Perhaps the two most interesting parts of his paper are really contributions of his own. In one part of the article he brings the well-known arguments of Cattell for the exclusion of the equality and doubtful cases to bear upon the more recent work of Müller and Urban. These equality and doubtful cases rest upon subjective definition and as they are dependent upon the subjective standards of confidence of the subject, the nature of the judgment which will be included in this group will differ considerably. Woodworth insists that these arguments are as effective against the inclusion of this class by the newer methods as they were in Fechner's day. In another portion of the paper, the author introduces the formula for the general relation between the variabilities of two components and the variability of the compound, and he conceives Weber's Law and Cattell's square root law as limiting cases; the formula reducing to Weber's law if $r = +1$ and to the square root law if $r = 0$.

The question of the magnitude of the thresholds obtained from the different psychophysical methods has been investigated by Tschelpanow (21). The methods of mean error, just perceptible differences, and right and wrong cases are considered. The author does not attempt to decide the question on mathematical or theoretical grounds, but exclusively by means of comparing the results obtained experimentally by the application of the three methods. Judgments of visual magnitudes are made with the help of a new apparatus which seems to have considerable merit. Unfortunately the results by the three methods were not taken simultaneously; those for the methods of mean error and just perceptible differences being taken successively during one year, and those for the method of right and wrong cases during the succeeding year. An insufficient number of determinations were made; some 12,000 being distributed over the determination for each of the three methods and for seven subjects. The thresholds obtained by the three methods turn out to be very similar but not identical. The differences, the author believes, are due to the different mental attitudes toward the problem aroused by the different methods. These values are closer than one would expect, considering the fact that the comparison is made of values that are not directly comparable, inasmuch as they were not taken simultaneously. Also as all of the subjects were naïve, we would expect progressive practice to play a considerable part.

Fernberger (6) attempts an experimental determination of his formal findings for shortening the practice of the method of constant stimuli. Working in the field of lifted weights, he mingled a normal series of seven comparison pairs (standard stimulus of 100 grams and comparison stimuli of 84, 88, 92, 96, 100, 104 and 108 grams) with a shortened series of five comparison pairs, exactly similar to the first series, except that the two extreme pairs (84 and 108 gram comparison stimuli) were eliminated. The interval of uncertainty obtained from these two series turns out to be practically identical for three subjects on the average. The point of subjective equality shows slight variation, being lower in the reduced series for two subjects and higher for another. A fourth subject gave exceedingly anomalous results, giving not a single equality judgment on one series of 1200 liftings. Believing that the anomalous results of the subject just described might be due to the subjective attitude with which he approached the problem, Fernberger (7) attempts to test this hypothesis further. Fourteen subjects were employed in a lifted weight series of the normal sort with the procedure of the method of constant stimuli. These were divided into two groups of seven subjects each. To one group the normal instructions for the formulation of the judgments were given. These, the author believes, tend to emphasize the difference judgments. To the second group, instructions were given tending to emphasize the equality judgments. The differences between the average of the interval of uncertainty are very large; that for the group to which the equality judgments were emphasized being nearly half as large again as that for the other group. The points of subjective equality for the two groups are very similar.

Ziehen (26, 27) studies the absolute impression in the tactual and auditory fields. The stimuli were sometimes presented in pairs, or at times only single stimuli were presented. The subjects were asked to give a difference judgment in terms of the three usual categories and also to designate the degree of assurance of this judgment, and they were furthermore asked to give an absolute judgment of the length or intensity of the stimuli in the two fields. The results show that absolute judgments occur very frequently—more frequently with the single stimuli than when the stimuli are presented in pairs. For the unequal pairs from 20 to 40 per cent. absolute judgments are given without uncertainty. In the early series there appears to be a slight increase of the number of absolute impressions which show no further increase in the later series. Changes in the frequency of correct absolute impressions occur during the series. Especially in the unequal pairs, the direction and consequent correctness of the judgment is intimately connected with the frequency of the correct absolute impression. Hence the author believes that the absolute impression has a great influence upon the correctness of the judgment. On the basis of an introspective analysis of these phenomena, the author finds that a judgment of absolute impression may occur either with or without the presence of an image. For the two subjects employed the image was almost always visual when it did occur, but might be present with various degrees of definiteness. The author would exclude the use of the term "absolute impression" from all cases except those made on the basis of a "total" image of the earlier stimuli of the series. In an appendix the author discusses the illusions of absolute impression which, for stimuli of about 5 cm. length, varied from impressions of from about 10 cm. to a punctiform impression.

Martin, Paul and Welles (15) report an investigation of the relation of sensory thresholds to reflex thresholds. Faradic stimulation is employed and the values expressed in Z units. A spot on the lower eyelid is chosen for stimulation for both series. Inasmuch as the spot stimulated is the same in both cases, the authors believe that the afferent pathways should be the same. The excitation from the two sorts of stimuli should travel very different pathways in the central nervous system, however, the reflex threshold through the brain stem, while the sensory threshold should involve the cortex. Inasmuch as this latter involves a more highly organized portion of the nervous system, the sensory threshold should be the more variable. The results show that the sensory thresholds are considerably more variable from their mean value than the reflex thresholds, either for the first perceptible lid movement or for complete closure of the eye. The direction of divergence from the mean is, however, nearly always the same for the two sorts of thresholds. They conclude that "the value of the sensory threshold depends on the state of the higher nerve centers, and that the threshold may be justly used, therefore, as an indicator of such nervous state." The normal threshold to faradic stimulation by the Martin method has been determined as about 100 B units; the extreme normal range being seldom over 140 B units. Grabfield (9) determines the threshold for 135 psychopathic cases and finds that these average 223 B units for the limen. Great differences in range are noted for the different sorts of insanities. It would appear that a threshold greater than 175 may be considered definitely pathological.

Gates (8) reports a repetition of Riecker's old experiment (1874) for the determination of the two-point cutaneous limen by the method of constant stimuli. The lower eyelid of the right eye was investigated. Nine categories of judgment were admitted instead of the three (one-point, two-point and doubtful) used by Riecker. The categories in Gates's experiment were point, point or circle, circle, circle or line, line, line or dumb-bell, dumb-bell, dumb-bell or two points, and two points. His results for three subjects are very regular. It is of interest to note that doubtful judgments (point or circle; circle or line, etc.) were very infrequently employed.

Dauber (4) attempts to study the results obtained by the use of a Lummer-Brodhun photometer. His conclusions are based on nearly 7,000 observations, an exceedingly large number for a photometric investigation. Besides making many practical suggestions for the accurate use of a photometer of this type, the author reports one observation that is of interest for our present field. He finds that the relative size of the difference thresholds varies considerably in relation to the intensity of the standard stimuli. These values decrease in size for standard stimuli of increasing intensity up to a certain point, and then, with a further increase of intensity of the standard stimuli, the size of the relative difference thresholds tend to increase again. The minimum seems to be somewhere between the intensities of 5 and 20 cp.

Petersen and Doll (17) attempt to discover if there are any significant differences between normal and feeble-minded individuals in the sensitivity to lifted weights. They employ a large number of subjects (203 feebleminded and 262 normal) but too few liftings for each. The method of right and wrong cases is employed, but only the upper threshold is determined. For the normal group the authors find a correlation coefficient of +0.63 between "discriminative capacity" and chronological age. For the feebleminded group the coefficient for "discriminative ability" and mental age is +0.36. The authors find a large number of their feebleminded subjects are unable to comply with the instructions of lifting—*i. e.*, successive liftings with the one hand, and they assert that this has diagnostic value.

Boring (2) investigated the sensitivity of the alimentary canal in a most painstaking investigation. The esophagus, stomach, rectum and colon were investigated. Boring's interest was primarily a qualitative one, the determination of the existence or non-existence of sensitivity of these organs to various kinds of stimuli: tactual, pain, temperature, electrical and chemical. He expresses his results in quantitative form, however. The study is of interest for the present review, primarily, for the fact that it is the first comprehensive study of these organs which attempts a quantitative examination of their sensitivity. Boring's second paper (3) takes up in greater detail the sensitivity of the stomach to thermal stimuli.

Lyon and Eno (14) report certain experiments on the perception of stimuli applied to different parts of the body with a slight time interval between stimulations. In their former study[1] these authors used electrical stimuli applied to the wrist and elbow of the arm—utilizing the method of just perceptible differences. In the present experiment, electrical and tactual stimulations are made at the same places and a modification of the method of right and wrong cases is employed. Unfortunately the authors insisted upon a judgment as to which of the two stimuli was felt first; synchronous answers were forbidden and in case one of these occurred, the subject was forced to guess. Also, unfortunately, the authors fail to include their results or even a mention of the number of them, in their article. They state that an electrical or tactual stimulus applied at the elbow 1/60 sec. after one at the wrist is perceived before the wrist stimulus. The time of conduction along nerve paths is much more rapid than this interval. The authors use this as the basis for an argument that "the cortical process precedes its correlative psychic process by a small, but not experimentally imperceptible, interval of time."

In the second edition of his book Lipps (12) has re-written the first three chapters. The domain of psychophysics is defined as anything having to do with the relation of consciousness and objective existence. The results of an experiment always yield ultimately a table, and from this table only four values are of primary importance; the arithmetic mean which becomes the representative of the entire series, the evaluation of the scattering of the series, the determination of the asymmetry of the series, and a value characteristic of the curve representing the observations. Chapters on the historical development of the science of psychophysics, emotions and the like, are included.

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[1] "A Time Experiment in Psychophysics," *Psychol. Rev.*, 1912, 19, 312–336.

Piéron (18, 19) studies the old law of Wundt that the sensory reaction-time decreases as a function of the increase of the intensity of excitation. He studies some results of his own for the different sense fields, and also considers the results of some of the older and accepted studies. The curve is relatively of a hyperbolic form and may in general be expressed by the formula

$$y = \frac{a}{x\alpha + (x\beta/b)} + K$$

in which y is the sensory reaction time, x the intensity of the stimulus as measured by the threshold, and a, b and K are constants. These constants vary for different modalities of sensation so that in any special case the general formula will have a particular and different form. These the author works out for most of the sensory modalities. In general he states that the "rapidity of the initial decrease of the latent time of sensations as function of the increasing intensity of excitation is relatively small for sensations with a great degree of excitability, while it is very great for those sensations of a small degree of excitability." These results are criticized by Henri (10) who insists that the term y is a complex of several factors, namely, the duration of the excitation necessary to produce the sensation, the duration of the afferent nervous processes, and the duration of the central and efferent processes preceding the reaction. Furthermore, the author points out the term x is very difficult of exact determination as we do not know, in many modalities, what we should employ as the intensity unit. This same criticism holds with even greater emphasis on the measure of the degree of excitability and is especially telling in the field of taste.

Bauch (1) tests further his belief that in meterological observations there is an observation error which consists in a preference for the "border-tenths" 1, 2, 8, 9 and 10, and a corresponding opposition to judgments in the "middle tenths" 3, 4, 5, 6 and 7. Confirmation is found by observations on the thermometer, strength and direction of the wind, and the degree of cloudiness, observations which are of a very different character.

Dunlap (5) reports a new apparatus for the testing of visual acuity. This apparatus consists essentially in the examination of a rectangle through a polished crystal of Iceland spar. This, of course, gives doubleness to certain of the edges of the rectangle. With a rotation of the crystal these lines may be brought to superposition. The method consists in a determination of the just perceptible differences in the edges of the triangle. The amount of the angle of displacement of the crystal is read directly from a scale. The measure of discrimination obtained with this apparatus is much lower than the usual measure of fusion in the ordinary object test.

Lutoslawski (13) contributes a philosophical article attempting to differentiate a new field of integral psychophysics. Differential psychophysics, the science as we understand it, is an attempt to study the relation of a small part of the objective world, with a small part of our consciousness. Integral psychophysics would be the attempt to ascertain the relation between the entire external environment of an individual and his mind in *toto*.

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DISCUSSION

VISUAL ILLUSION—A QUERY

In connection with a series of experiments to determine the effect of slight intensity of illumination on the apparent form and color of circular figures on a uniformly colored background two interesting phenomena were observed. At very low intensity of illumination a single circular ring, or several concentric rings, take on a polygon effect; also that part of the uniform field which is enclosed by the single ring appears to be darker than the surrounding area. No mention of these phenomena has been discovered in the literature. If anyone can supply references it will be appreciated.

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NOTES AND NEWS

A definite announcement is made in *Nature* that the report of the death of Professor Ivan Pavlov, which was copied in the March Bulletin, is incorrect, and that the noted Russian physiologist was alive on March 20. The mistake was probably due to the commonness of the name of Pavlov, there being no less than five professors of that name in Petrograd.

Professor Raymond Dodge, of Wesleyan University, lectured at the Carnegie Institute of Technology on May 8, on the psychological effects of alcohol.

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THE
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GENERAL REVIEW AND SUMMARY

GENERAL PSYCHOPATHOLOGY

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The reviews and summaries of this number of the BULLETIN are intended to deal with general or theoretical psychopathology such as the large German textbooks on psychiatry set forth in the portions termed *general*, *e. g.*, in that portion of Kraepelin's well-known textbook termed "Phenomena of Insanity." The literature of what may with all due respect be termed the Freudian sect is not here extensively considered, since that literature is gathered in accessible special journals.

Perhaps the most important achievement of the year's literature is the publication of the fourth volume of Kraepelin's "Psychiatrie," containing the third and concluding section of the clinical portion of this work, which is now in its eighth edition. It seems worth while to review more or less extensively the entire work, 1909–1915. The first volume, dealing with general psychiatry, naturally contains much of interest to the psychologist. This volume, published in 1909, has its material distributed under five headings: Causes, external and internal; phenomena, perceptual, intellectual, emotional, volitional; course, outcome, and duration; diagnosis; and treatment.

The section on "Causes" devotes more attention than in previous editions to the matter of localization with reference to Gall and the modern phrenology of Möbius, Nissl, the cortex topographers (Brodmann, Cajal, and Campbell), Wernicke, Flechsig, Liepmann. Kraepelin regards Wernicke's views as too simple and dismisses somewhat shortly the Wernickean concept of somatic happenings as related with the innermost cell layers of the cortex, the consciousness of external happenings as related with intermediate layers, and consciousness of the self as related with outer layers; the concept which Wernicke briefly described as one of stratified deposits of ideas like the sedimentary formations of early geologic history.

A full recognition is granted of the newer notions of Liepmann concerning agnosia, described briefly as an absence of more or less widespread psychic resonance relative to sense impressions. Besides sensory agnosia Kraepelin also comments favorably on the so-called ideational (*ideatorisch*) agnosia, to which concept belong mind-blindness and mind-deafness in the wider sense of these terms. Kraepelin surmises that there is a group of very simple and habitual processes of recognition which are executed almost independently of attention, such as the processes connected with the starting movements of speech or strong feelings. Here he supposes the recognition depends upon cortex tissue very near the end stations of the sensory paths. Close connection with expressive movements might well be favored by limitation of the process to one hemisphere. Ideational recognition, on the other hand, can hardly be related with such narrow areas. The cortical basis of ideational recognition must rather be connected with processes widespread over the cortex, and in point of fact the ideational forms of agnosia are found to be related with widespread disease and not with focal lesions.

Kraepelin also comments at some length on the generalization of the aphasia doctrine to cover the whole wide field of apraxia. We must here distinguish, following Liepmann, between ideational and motor apraxia. The so-called "motor formula" of a planned act of the will is composed of a number of partial ideas of the aim of the act in question. Each of these particular processes must work in harmony with the chief aim of the act. The presupposition of any voluntary act is an idea of this purpose or end of the act in question. Under pathological conditions the motor formula may be false or incomplete to start with, or during the execution of the formula, additions, omissions, and transpositions may occur so as to interfere with the execution of the end proposed. This kind of thing is termed ideational apraxia and corresponds to the paraphasic and paragraphic disorders of the classical aphasia doctrine. This ideational apraxia, like the ideational agnosia above mentioned, cannot be produced by the destruction of circumscript areas of the cortex. Agnosia itself, however, is rather apt to falsify the motor formula and to produce apraxia. These agnostic disorders are apt to be related with lesions of the posterior parts of the cerebrum on account of the posterior situation of the chief sensory areas, and accordingly ideational apraxia is more commonly related with disorder of these posteriorly lying regions. Nevertheless the disorder remains commonly related to widespread cortex disease. If the motor formula is intact but its translation into actual action is perturbed, then we are dealing with motor apraxia. It is apparently true that motor apraxia may be produced through an inability on the part of the particular constituent impulses of a given motor formula to reach the proper discharging zones for the movement proposed. The relation of motor aphasia and agraphia to left-sided areas is well known. Liepmann has pointed out that the preferential usage of the right hand has given the left hemisphere a certain predominance in the execution of habitual voluntary acts. If the connection of these left-sided cortical areas habitually used in machine-like acts with the right hemisphere is interrupted by destruction of the commissural fibers of the corpus callosum, then according to Liepmann the total effect of the inuring of the left side to habitual processes is lost at a blow and the movements of the limbs on the left side become to a certain degree apraxic. Kraepelin calls attention to the value of studying agnosia and apraxia in psychiatric material. Agnostic phenomena are especially worthy of study in instances of extensive cortical destruction, as in general paresis, brain syphilis, and arteriosclerosis, but also in delirium tremens, the deliria in general, and in epileptic dazed states. Peculiar forms of apraxia and parapraxia are found in catatonia.

On the whole, Kraepelin is not enthusiastic as to the relation of mental phenomena to special regions of the brain. Tumors of the corpus callosum must be regarded as related with profound intellectual disorder, but whether this disorder is due to the destruction of the commissural fibers or to the involvement of cortex areas remains doubtful. Perhaps the most important point in this direction is still that of Oppenheim concerning the relation of *Witzelsucht* to destructive lesions of the frontal lobes.

A due weight is given by Kraepelin to all the sciences which must be drawn upon for the solution of these problems. He commends work upon artificial intoxications as the nearest pathological method of approach to the problem. Maniacal excitement is the phenomenon which stands tentatively nearest to alcoholic intoxication, although the phenomena of paralysis are absent from mania. If the finest possible psychological analysis of these phenomena and the finest histological analysis of the cortex could be undertaken in experimental material, then our knowledge would widen. The closely comparable phenomena of presbyophrenia and of Korsakoff's disease might serve as an important material for analysis. On the whole, it is somewhat remarkable that Kraepelin, with his familiar Wundtian training, should go so far as he does in this edition to uphold some of the darling contentions of the localizers.

Incidentally, in the section on "Causes," Kraepelin takes up the Freudian contentions as to the causal significance of disorders of the sexual life in the matter of neuroses (neurasthenia and anxiety neuroses) and the psychoneuroses (hysteria and obsessive neuroses). According to Kraepelin, Freud holds the view that neurasthenia is produced by masturbation, anxiety neurosis by insufficient sexual satisfaction, and the psychoneuroses by the after effects of infantile sexual experiences, the memory of which has been repressed by the patients. Although Freud has given up the doctrine in this over-sharp form, still he remains inclined to attach extraordinary weight to sexual experience in the production of these forms of disease. Hysteria is a matter of repressed sexuality. The disorders of the sexual life are conceived as metabolic anomalies and somewhat resemble the phenomena of Graves' disease and of Addison's disease. Some of the Freudians have found traces of sexual childhood experiences in other disorders, such as the delusional formations of dementia præcox. Kraepelin in 1909 regarded the proof as hardly brought for these ideas, emphasizing the infinite frequency of sexual experiences of the Freudian nature in persons who do not succumb to these diseases. Kraepelin acknowledges that Freud is willing to admit that the particular form in which the sex experiences are worked up is more a phenomenon of disease than a cause thereof.

Later in his work, in Volume III, 1913, Kraepelin has another fling at Freud. Considerable attention is given to the ideas of Bleuler, Jung, and Freud as to dementia præcox. Bleuler and Jung insisted that the causes of the phenomena of dementia præcox at least have some relation to "complexes" in the sense of Freud, namely, to groups of ideas with a strong feeling tone, these "complexes" being unusually powerful in view of the predispositions which dementia præcox patients exhibit. According to Jung, the ego is robbed of its light and air by these complexes, much as the body is robbed of its vital force by a cancer. The basis of these assertions concerning dementia præcox is supposed to be improvements or deteriorations brought about by the action of psychic causes, as well as the fact that the patients often preserve over long periods ideas which are related with emotional occurrences in their lives. Statistically speaking, however, according to Kraepelin, dementia præcox exhibits far fewer of these examples of the persistence of emotion-laden "complexes" than might be expected, and in point of fact the disease runs more or less characteristically without such so-called "complexes." To be sure, one may conceive that the ideas are repressed and transformed only to be unmasked by meticulous association experiments and dream analysis, which Kraepelin confesses is a process that is not over alluring to him when he contemplates what has already been done in the matter. On the other hand, if complexes are not causes but are nothing but the delusional ideas in which the fears and wishes of the patients are mirrored, then according to Kraepelin we are dealing merely with a new phrase for an old situation. Much more strenuous proof must be brought, according to Kraepelin, to convince the world of the existence of these psychic neoplasms which, on the one hand may be completely withdrawn from influence by the ego, but, on the other hand, are at times enabled to transform it completely and almost to annihilate it. According to Jung's idea, if a dreamer were to walk about and act in the manner of a waking person, then we should have before us a clinical picture of dementia præcox. Kraepelin dismisses this concept as not worthy of controversy. Kraepelin regards the separation of the phenomena of disease into primary and secondary symptoms as an artificial one. Riklin had, for example, regarded the negativism, false identifications of bystanders, various delusions, senseless responses, perseverations, and catalepsy, as resting upon "complexes" hindering a proper adaptation of the patient to the environment.

Kraepelin apparently looks with more favor upon Bleuler's division of the schizophrenic disorders into fundamental and accessory, the former making up the center of the clinical picture and the latter often absent. Bleuler seems to regard the complexes as influential in the form of the clinical picture, whereas Jung seems to take the complexes as the actual causes of the disease, conceiving the emotion-laden complex as acting precisely as might a trauma or an infection in producing mental disease. Kraepelin makes clear that he does not regard the trauma or infection hypothesis as any better founded than that by complexes. If, as Jung has at times thought, the emotional disorder might produce a toxin which would in itself turn about and produce disease, then, inquires Kraepelin, why should not manic-depressive psychosis with its extraordinary display of emotional storms be the disease which should produce toxins in Jung's sense of such strength as to produce complete dementia?

Toward Abraham's application of the Freudian views on the sexual side to the theory of dementia præcox, Kraepelin takes an equally polemical attitude. He regards these concepts as belonging to "metapsychiatry." He agrees that many of the speeches and acts of dementia præcox patients are not so senseless as they appear and that sexuality plays therein an important part. Abraham regards dementia præcox as based on an "autoerotic predisposition." There is an incapacity to "Objektliebe," carrying in its train mal-attitude to the environment, involvement of the parents in erotic ideas, ideas of persecution, tendency to masturbation, and ideas of grandeur based upon a sexual over-valuation of the patient's self. The persecutors are former lovers; hallucinations always refer to a complex. The delusional system of the patient is not in the slightest degree senseless but follows the same laws as does a dream, and the complexes in question are almost without exception sexual.

Kraepelin returns once more to the question of Freud in his consideration of hysteria (1915). Kraepelin now endeavors to distinguish in hysteria two major forms: a degenerative hysteria with virtually a congenital origin and a life-long duration, and a developmental hysteria, incidental as a rule to the development of the sexual phases of life. The good therapeutic results in hysteria occur in the latter forms and are founded upon a species of education and the creation in the patient of an increased power over his emotional life and its expression. The treatment of these cases must be individual and bear in mind the total psychic personality of the patient. The central feature of the situation is what the patient believes. It is in this manner that Kraepelin endeavors to explain the good therapeutic results claimed for the Freudian procedure of catharsis. Kraepelin admits that it is possible that the awakening of repressed memories and the reduction of inner tension may produce favorable effects even at times of a permanent nature. Still, Kraepelin denies that as good results have been obtained as the world has been given to believe. Kraepelin seems willing to match the effect of intelligent individual treatment of hysterics with any results of the Freudians. The reason for this, he thinks, is that the supposed causal relations of hysterical phenomena to repressed ideas do not exist. The process of cure, indeed, endeavors expressly to convince the patient of the connection between his symptoms and these ideas and to convince him also of the dependence of cure upon their removal. Kraepelin looks with concern upon the ventilation at any price of all possible sexual ideas and thinks that the harmfulness of the procedure must be evident to any one who reads Freud's "Bruchstück einer Hysterieanalyse."

In the reviewer's paper (1914–15) on the topographical distribution of cortex lesions in anomalies of dementia præcox (17) is a summary of Kraepelin's views as to the possibilities in the causation of dementia præcox. He lays much stress upon sexuality.

Among external causes of mental disease, Kraepelin counts not only somatic causes, such as brain disease, intoxication, and the like, but also psychic causes, among which he classifies emotion, strain, prison conditions, wars and catastrophes, and the so-called psychic infection, including epidemics, induced insanity, post-hypnotic insanity, and the like. In an analysis of 4,079 cases studied in the Munich clinic, Kraepelin finds that 2.5 per cent. of the mental diseases in question had psychic causes; these cases were especially cases of traumatic neurosis and prison psychosis.

The fourth volume (1915) contains about 150 pages of analysis of the psychogenic diseases, and contains a number of new and interesting terms. Sommer had limited the term *psychogenic* to those mental disorders characterized by influencibility in psychic ways and to a concept somewhat like the Kraepelin notion of hysteria, a disease in which emotions readily and rapidly affect the total mental life and bring about a variety of somatic phenomena, sensory, motor, vascular, glandular. Kraepelin prefers to adopt a broader concept of the term *psychogenic* and cause it to include not only hysteria but a series of other psychoses psychically caused but without hysterical signs. Without considering clinical details, the psychologist reading Kraepelin cannot fail to be interested in his division of the non-hysterical psychogenic psychoses into three forms, as follows: First, Kraepelin distinguishes the *ponopathies* or neuroses incidental to activity, such as nervous exhaustion with its causation by fatigue and overwork, its hypochondriacal feelings, its neurasthenic phenomena. In fact, the mildest forms of nervous exhaustion are very frequent and are "familiar to every one who has been forced to work for long above his strength." Perhaps it might be well to attach Beard's term *neurasthenia* expressly to this combination of nervous exhuastion and overstimulation found in the ponopathic group. Alongside the nervous exhaustion form of ponopathies, Kraepelin places another condition which he terms *Erwartungsneurose.* This is a group of nervous disorders based on anxiety and apprehension and paralleled in normal experience by the gradually increasing inner tension produced by awaiting some critical event. The *douleurs d'habitude* of Brissaud and the *akinesia algera* of Möbius may belong here. The reviewer would suppose that this group of cases would be particularly suitable for examination by psychologists because many of the effects appear to be quantitatively and not qualitatively different from the every day phenomena of student life.

Over against the ponopathic disorders Kraepelin places what he terms the *homilopathies* or *Verkehrspsychosen.* These psychoses are essentially social and incidental to the relations of man to man. The familiar *folie à deux* or induced insanity is the most frequent homilopathy; a less frequent form is the delusional insanity of the deaf.

In addition to the ponopathies and the homilopathies are what may be called the vicissitude psychoses or *symbantopathies.* Here we deal with the psychogenic mental disorders of prisoners and with the well-known querulant cases. It is possible that this division of the psychogenic disorders in the pono-, homilo-, and symbantopathies may be suggestive to psychologists.

When Kraepelin passes from the so-called external causes to the internal ones, he calls the latter predispositions and distinguishes such general predispositions as age, sex, race, climate, living conditions, vocation, and civil status, from personal predisposition. Personal predispositions consist of heredity, mal-development, degeneration, influences of education, and idiosyncrasies. There are no striking novelties in this account. Of general as well as psychological interest is a brief description on pages 208 and 209 of the first volume of seven major groups of the psychoses. (First, somatic, 1.3 per cent.; second, syphilitic, 10.3 per cent.; third, alcoholic and drug, 22.8 per cent.; fourth, psychic, 2.5 per cent.; fifth, senescent, 5.6 per cent.; sixth, a group containing dementia præcox, epilepsy, and feeblemindedness, 27.2 per cent.; seventh, a group containing manic depressive psychosis, psychopaths in general, and hysterics, 30.3 per cent.) The percentages are based upon 4,079 Munich cases. The figures are perhaps of local interest chiefly, but the grouping of dementia præcox, epilepsy, and feeble-mindedness, on the one hand, and the various psychopathies and manic depressive psychoses on the other, is a suggestive indication of Kraepelin's general tendencies.

The long section on the phenomena of insanity does not require especial analysis. Perceptual disorder takes up hallucinations, clouding of consciousness, disorders of the intake of ideas, and attention. It is important for psychologists to note that the psychiatric usage of the term *consciousness* does not at all accord with the definition often applied by psychologists. The psychologist often greets with astonishment the psychiatrist's phrase to the effect that such a patient has no disorder of consciousness when it is clear that the patient is mad. A delusion for the psychiatrist, or even an hallucination, is not a disorder of consciousness.

Under the heading of disorders of intelligence are taken up the usual matters, beginning with memory and orientation, and proceeding to more complex matters after the Wundtian fashion. Under emotional disorder are considered not merely the obvious matters but also a certain number of phobias and the like. The majority of the sexual disorders are, however, taken up under the head of "the will."

Passing over the third section, we find in the section on "Diagnosis" also little of direct psychological interest except perhaps a discussion of the so-called *Zustandsbilder*, or habitual forms of disease in the manner of Kahlbaum. The logician may wonder what the psychiatrist's concept of a psychotic entity really is; perhaps here is the clearest Kraepelianian description of a modern point of view.

The section on "Treatment" has a considerable and rather closely written chapter on prevention, which should be of value in the mental hygiene propaganda. A number of questions as to the marriage of psychopathic persons and as to school hygiene are systematically taken up. The duties of the state in connection with science and education are classically pointed out. A note is made of the value of women physicians in the treatment of female patients.

The section on "Institutions" is particularly worth reading and lays particular stress on psychopathic hospitals or "*Stadtasyle.*"

The clinical portion of the textbook has in places much to interest the psychologist. A careful, condensed discussion of psychological work in alcoholism is given in the second volume. Numerous samples of handwriting, tremors, and the like, appear throughout. The psychologist's attention should be drawn to the peculiar speech disorder of Alzheimer's disease, perhaps a particular form of sticking or logoclonia. The third volume (1913) deals with dementia præcox, epilepsy, and manic depressive psychosis. Dementia præcox and a new group of mental diseases, the paraphrenias, are grouped together as endogenous deteriorations. The paraphrenias, or paranoid deteriorations, are interesting to the psychologist because of the limitation of the psychopathic phenomena to the intellectual side, and the comparatively small part played by disorders of the emotions and will therein. Paraphrenia, in fact, corresponds in large measure with the disease described by Magnan as chronic delusional insanity with a systematic development. Nothing of especial interest or psychological novelty appears in the discussion of the endogenous deteriorations unless it be the so-called schizophasia or *Sprachverwirrheit.* (The term schizophrasia is built up on the analogy of Bleuler's schizophrenia.)

The value of systematic manuscript tests in manic depressive psychosis is insisted upon. Of general interest is the description of certain fundamental states which an important proportion of manic depressive patients exhibited between their attacks. These fundamental states may even prove of characterological value. These interval states are either depressive, maniacal, irritable, or variable in such wise as to deserve the term cyclothymic. The familiar mixture of motor, sensory, and higher psychic activities is again shown in the Kraepelinian discussion of these so-called fundamental states or dispositions.

The fourth volume takes up not only the psychogenic disorders above mentioned but also hysteria with its somewhat interesting subdivision into developmental and permanent forms. The former goes on to the discussion of paranoia, certain so-called original states of mental disease, psychopathic personalities, and feeblemindedness. The disputes as to paranoid dementia præcox, paraphrenia, and paranoia, are of subordinate interest to the psychological reader. Nor is there perhaps much essentially novel in the discussion of nervosity, obsessions, impulsive insanity, and the sex perversions. A discussion of the so-called psychopathic personalities (144 pages) promises to be of considerable value as material with which to compare such contentions as those of Healy in his book last year reviewed, *The Individual Delinquent.* Kraepelin seems to find in his material seven groups of psychopaths. Whereas a so-called *originär* case is, as it were, a congenital victim of a mental situation which always bears the stamp of the morbid, the psychopathic personality bears rather the stamp of a personal peculiarity. These peculiar persons only arrive in psychiatric institutions under exceptional circumstances and they appear to grade over by degrees into more normal human characters. Thus the victim of nervosity, the *degeneré-supérieur*, seems to be emotionally and volitionally insufficient to the demands of life. Again, the victim of obsession has a lively feeling of domination by certain ideas or fears. The pyromaniac, kleptomaniac, or other form of so-called monomaniac, belongs also among these so-called original states of mental disease, as do also the sexual perverts.

Among the psychopathic personalities Kraepelin distinguishes a group which he terms excitable. These patients only occasionally find their way into institutions for the insane and then only on account of violent states of excitement brought about by some external occasion, usually trivial. In these excited states the patients are apt to be suicidal or homicidal, or otherwise to disturb the public order. The attacks are very brief. This group is of exceeding importance naturally from the point of view of criminology. A second group are the so-called unstable patients with lively imaginations, exaggerated ego, instability, influencibility (easily led astray), easily succumbing to alcohol, with tendency to sexual disorders, spendthrift procedures, crime, and suicide. Another group is formed by the so-called *Triebmenschen*, including some of the psychopathic globe trotters, periodical drinkers, and the like. A group of *Verschrobenen* has some relations to dementia præcox and paranoia. Another group is the classical group of pathological liars and swindlers, recently taken up by the Healys in a special monograph (4). Other groups are the anti-social group, and a group of pathologically quarrelsome persons.

Without laying overmuch stress upon the finality of this analysis, it is clear that criminal anthropology and characterology have much to learn from psychiatry.

As to feeblemindedness, or what Kraepelin terms *Oligophrenia*, little need here be said except that Kraepelin commends highly the modern endeavor to estimate the grade of feeblemindedness by special methods. He terms the work of Binet and Simon a great service. He discusses briefly the pedagogical and psychological groups of tests, paying considerable attention to the work of Bobertag.

One supposes that this most extensive of all attempts by a single author to cover the field of psychiatry is Kraepelin's definitive edition. One misses therein the exact definitions which abound in Ziehen's more condensed work. One misses the artistic simplicity and originality of Wernicke's "Grundriss." In the clinical portions of the textbook enormous paragraphs bulge with phrases and descriptions evidently drawn from card catalogues or other collections of notes concerning great series of cases. The book can be rather readily skimmed by reading the first sentence of each paragraph, notably in the clinical portions. Other parts of the work are characterized by close and condensed writing. The English reader is impressed with an apparently large vocabulary, of which many words are used in a sense not far removed from clinical slang (for example, the description of a form of dementia præcox as *läppische Verblödung*). Although the work may have less psychological interest than the space devoted to it might argue, yet it seems well to insist upon the storehouse of material for psychology which systematic textbooks of psychiatry contain.

In contrast to the textbook of Kraepelin, the "Lehrbuch" of Binswanger and Siemerling contains little of psychological interest. Its general symptomatology (Binswanger) follows the same four-fold order above mentioned. It may be of value for the psychologist to have upon his shelves an occasional edition of this work to illustrate the non-Kraepelinian views of psychiatry held by a number of German alienists.

Last year considerable space was devoted to various volumes in Aschaffenburg's "Handbuch." Of the voiumes which have since appeared that containing the "Etiology of the Psychoses" by Voss and "General Symptomatology" by Aschaffenburg himself is of greatest interest. The work of Voss is not subdivided into chapters and can be used conveniently with the index. There is an interesting bibliography with rather more reference to non-German literature than usual. According to Voss, the views of Freud and his followers as to the significance of psychic trauma for hysteria are in the foreground of discussion. The spirit of the sexual ideogenic factor of dementia præcox is indicated by Jung's designation of this disease as a psychogenic twin sister of hysteria. Voss has insisted upon the Freudian mechanisms in manic depressive psychosis, not to be sure for the mechanism of the "circularity" of this disease but for the non-circular symptoms; for instance, the mixed manic depressive situations are based on ideogenic complications of this nature. Voss quotes with approval the views of Hoche to the effect that the doctrines of so-called psychoanalysis are well founded neither theoretically nor empirically. Its therapeutic effect is unproved. Its permanent gain for clinical psychiatry is nil; it conveys the impression of unscientific method; its pursuit is dangerous for the patient and compromising for the physician; and its only permanent interest is in the field of the history of *Kultur.* What Kraepelin terms the symbantopathies or *Schicksalspsychosen* are here termed situation psychoses (Siemerling, Stern).

Aschaffenburg's account of the general symptomatology of the psychoses deviates from the common order of consideration. Aschaffenburg takes up after certain matters of physical and neurological examination, first, the emotional life, and follows this with a discussion of perception, recognition, attention, and their disorders, consciousness, memory, ideation, intelligence, and judgment, and the will. The introduction contains a bit of a polemic against Freud. The psychoanalytic movement is regarded as showing how the personality of the observer mirrors itself in what is seen in the patient. It was, significantly, with the self-same method that Freud and his followers formerly read "trauma" into the words, movements, dreams, and thoughts, and now read "wish" out of the same facts; first holding trauma as the cause of nervous disorders, now the Freudians hold wishes to be their cause. Then Adler found *Minderwertigkeit.* The change of view has gone on within a few years, and the same persons are engaged in the transformation of these theoretical views. Is it not warrantable, asks Aschaffenburg, to see in psychoanalysis, just as in amentia, paranoia, dementia præcox, and manic depressive psychosis, changes of the observer in the guise of changes in observations? Is there not therein a danger of *Einfühlen*? There follows discussion of Jaspers's point of view with some remarks upon experimental psychology. The text of Aschaffenburg's account has pretence to little novelty. The literature considers Ach (will, etc.), Binet and Simon, Bleuler, Cramer (hallucinations of muscle sense, etc.), Gregor (experimental psychology), Heilbronner (classical work), Kraepelin, Liepmann, Moravcsik (association experiments, etc.), Pfersdorff (clinical symptoms), Pick (various symptoms), Raecke (epileptic phenomena), Ranschburg (pathology of memory, etc.), Rittershaus (psychology of evidence), Sommer, Taalman (association studies), Weiler (pupil examinations), Weygandt (sleep, dreams, etc.), Ziehen, and others.

A new textbook on the diseases of the nervous system has been brought out by Jelliffe and White (7). These authors divide their material into three parts called respectively, Physico-chemical Systems (vegetative or visceral neurology), Sensori-motor Systems (sensory-motor neurology), Psychic or Symbolic Systems (neuroses and psychoses). The first part of the work deals with the autonomic and sympathetic systems and the internal secretions in general and the endocrinopathies in particular. The sensori-motor neurology, so called, constitutes a condensed, up-to-date account of those matters ordinarily contained in textbooks of clinical neurology. The psychologist must be especially interested in the third part of the work, on the so-called psychic or symbolic systems. The authors take the field of the neuroses and psychoses to be not only the broadest field in psychiatry but perhaps the broadest field in medicine. The authors consider that the baby in its mother's uterus has no desires, but the phase of desire begins shortly and the "amoral egocentric baby" is forced to order his conduct "along certain lines which imply a putting off of the satisfaction of desire." "Conflict is at the very basis, the very root, of mental life." "Some thinking is dictated by reality motive, other thinking by phantasy formation in which the reality motive is replaced by the pleasure-pain motive. The desires which belong to infancy, thus early repressed and substituted by other forms of activity, constitute the material out of which the desire is formed and the material from which come the activating moments for phantasy formation." "Between this realm of the unconscious which contains relatively infantile material only and the realm of the clear conscious, there lies the realm of the so-called fore-conscious which contains the material of recent experience." Important constituents of this unconscious realm are the early jealousy of a younger brother or sister who deflects affection otherwise monopolized by the child; love of the parent, characteristically the parent of the opposite sex, and the like. "For example, a patient marries a man who unfortunately presented a number of very close resemblances to her father. These resemblances serve to stir into activity the unconscious love for the father, and she therefore, in her feelings toward her husband is outraged beyond all endurance, for it is as if she were married to her father. Life with her husband is quite unendurable. She is constantly flying into passions, insulting him, upbraiding him, etc." Of course such a patient should have been able to emancipate herself from the necessity for the love of her father; but there had been an "undue fixation" on the infantile level, hence there will occur a "driving back of the psycho-physical energy within the individual under conditions of stress."

The technique of finding the content of the unconscious—that is, whether the patient had symbolically married her father—is by a study of dreams. The psychoneurosis, like the dream, is a compromise between desire and fulfilment, but it is also "a wish-fulfilling mechanism that brings to pass the fulfilment, both of the wish in the foreconscious, the wish with reference to the difficulty that caused the introversion in the first place, and also the wish in the unconscious, the wish at the fixation point, which serves as a pull-back once the introversion has started."

Besides the commonly accepted psychoneuroses, an exposition is made of the so-called *actual* neuroses. Neurasthenia is a condition resulting when the discharge of seuxal energy is inadequate upon the somatic side. Anxiety neurosis is the disease which occurs when the discharge is inadequate in the psychic sphere. Yet the anxiety "while it is a psychic fact, is still not of psychic but somatic origin." Its "source can only be found at the physiological level. This anxiety arising at the physiological level and manifesting itself in the psychic sphere then becomes a free floating anxiety," which may attach itself to any idea and therefore appear to be of psychic origin. "While fear is the emotion which corresponds to a danger threatening the organism from outside, anxiety corresponds to a danger which threatens the organism from within."

On pages 624 to 631 is an account of the technique of psychoanalysis, which is defined in general as "an analysis of the patient's mental condition sufficiently complete to thoroughly understand the somatic manifestations of his malady." The patient's original statement is made as far as possible without interruption. Exact arrangements for consultation, "preferably not less than three times per week, of an hour's duration each," are made, and arrangements made for the fee. Psychoanalysis should not be performed while the patient is under the care of another physician. As to the psychoanalytic conversation, "it really makes very little difference how one starts." "During the course of the psychoanalytic conversations one will get very shortly to a point from which progress seems to be impossible, for it does not take long to exhaust the consciousness of the patient. One then has to penetrate the foreconscious, which is relatively easy, and the unconscious, which is relatively difficult. The method of procedure here is the method by free association." At this critical point, the patient is made to relax so far as possible into a condition of perfect passivity, whence he is to observe his thoughts and recount them. At the outset of this condition of passivity, patients often will not speak for a time, or state that nothing is entering the mind. This circumstance is due to the interference of the repressed complexes. It is then explained to the patient that his mind cannot be "an absolute blank." Absurd, inconsequential, extremely disagreeable ideas must be vouchsafed to the physician, who will utilize them even if the patient cannot. Hesitations, stammerings, mistakes, slips of the tongue, must be recorded, since such matters may be due to the fact that the repressed complex is "struggling, as it always is, for expression." But the most important single aid in determining the content of the unconscious is the dream. Split-off complexes are actively repressed by the patient and express themselves in symbolic form. "The physician is, therefore, so to speak in a position to come up on the blind side of the patient." The mechanism of cure seems to depend upon the ability of the patient to deal with the elements of his conflict frankly, openly, and intelligently. Most neurotics have psychoneuroses or "introverted psychoses"; that is, their interests are turned within upon themselves. "In the course of psychoanalysis, it often happens that the interest of the patient turns from himself to the physician (the phenomenon of transference, the barometer of the relationships between physician and patient)." "Transfer dreams" of the physician occur. The contents of these transfer dreams are often of value in the critique of the physician. If the transference is too intense, it must be discussed with the patient and analyzed "so that there is no misunderstanding as to what his real meaning might be." "It is because of the necessity of transfer to the successful psychoanalytic handling of a case that it is undesirable to have another physician treating the patient at the same time. The other physician might acquire the transfer, and this would prevent the psychoanalyst from accomplishing anything." "At the conclusion of the treatment, when the transfer has been fully analyzed and the patient understands what it means, then the physician steps aside." "It must be borne in mind that the symptoms of a neurosis or psychoneurosis might cover and conceal a true psychosis."

I have made the above excerpts from the work of Jelliffe and White, not because they adequately represent the scope of the work, which is a textbook entirely suitable for third year medical students of neurology, but it seems worth while for the psychologist to know what is the present-day attitude of some leading neurologists toward psychoanalysis. The textbook is supplied with an excellent array of diagrams.

A translation of Jung's book, "Wandlungen und Symbole der Libido," by Beatrice M. Hinkle, of New York, has been published under the title, "The Psychology of the Unconscious" (8). The poetic quotations have been translated into English by Mr. Louis Untermyer. An introduction by Hinkle gives a brief historical account of the work of Freud and Jung, the development of the ideas of Bleuler and Freud, the utilization and giving up of hypnosis, the adoption by Jung of the term *complex* for important groups of ideas or impressions with feelings and emotions clustered around them, the concept of repression and of resistance, the concept of the unconscious "used very loosely in Freudian psychology and conforming strictly to the dictionary classification of a 'negative concept which can neither be described or defined,' " the early theory of infantile sexual trauma and its abandonment in favor of the infantilism of sexuality, the observation of the polymorphous perverse childish expressions of sexuality, the Freudian concept of sexuality ("practically synonymous with the word *love*"), the importance of phantasy-making and indulgence in day dreams, the observation that these phantasies and "queer thoughts" are traceable to distinct wishes and desires, the discovery of the importance of dream analysis and the symbolic nature of dreams, Abraham's identification of the myth as a fragment of the infantile soul life of the race, the concept of transference, the development by Freud of the idea of *libido*, the discovery of the so-called Œdipus-complex as the nuclear concept of every neurosis, the concept of the incest barrier, and the concept of fixation of *libido* upon early objects with failure of development of normal psychosexual character—all these and other phases of the history of Freudism are briefly told. The remainder of the introduction deals with the differences between Freud and Jung: Jung is unable to confine himself to the limitation of the term *sexual*, even to the wide significance ultimately allowed by Freud. The term *libido* for Freud means the concept of "unknown nature," comparable to Bergson's *élan vital.* a hypothetical energy of life "occupying itself" with sexuality but also with growth, development, hunger, human activities and interests; in short Jung identifies *libido* with "cosmic energy or urge" and compares it with the energy of physics. Many of the difficulties in life are due to the withdrawal of *libido*, which is almost tantamount to losing interest in one's surroundings since it is the *libido* "that we bestow upon an object that makes it attractive and interesting."

Again, Jung differs from Freud as to the so-called polymorphous perverse childish manifestations of sexuality. According to Jung, the first stage of human life up to about the third or fourth year is the presexual stage, corresponding perhaps with the caterpillar stage of the butterfly. The second stage runs until puberty (the pre-pubertal stage). Thereafter comes the third, or adult, stage. The point in the so-called polymorphism of the presexual stage is, according to Jung, a gradual movement of the *libido* "from exclusive service in the function nutrition into new avenues"; of it is fixation of the *libido*, it is arrest or retardation at any phase which creates neuroses. An important childish *libido* occupation is phantasy-making. Those who stick in this phase are introverted. As to the nuclear or root complex of Freud, Jung feels that it is not the real father and mother who inhabit the complex, but rather an *imago*, or subjective, father or mother. The Œdipus-complex of Freud is for Jung symbolic, and Jung does not accept the theory that in the early stage of childhood the mother has any "real" sexual significance for the child. In direct opposition to Freud's notions, Jung does not see in the infantile phase any real cause for the later development of a neurosis. In fact, the seeking for a cause in the past is merely to follow the desire of the patient to withdraw himself as much as possible from the situation which the disease presents. Let there enter some important task for the fulfilment of the ego of the individual, let an obstacle arise, *libido* is stirred up and regression occurs, vast ways of *libido* occupation are re-animated, regressive infantile desires and phantasies are converted into symptoms; "therefore Jung does not ask from what psychic experience or point of fixation in childhood the patient is suffering, but what is the present duty or task he is avoiding, or what obstacle in life's path he is unable to overcome." Thus, according to Jung, the "elaborate phantasies and dreams produced by these patients are really forms of compensation or artificial substitutes for the unfulfilled adaptation to reality. The sexual content of these phantasies and dreams is only apparently and not actually expressive of a real sexual desire or incest wish, but is a repressive employment of sexual form to symbolically express a present-day need." According to Hinkle, we must consider as established a definite psychological "determinism." Again, we must feel that the conscious mind is relatively far less important than the unconscious. (The image of Stanley Hall is quoted in which the conscious mind is compared to the eighth of an iceberg visible above the water.) Again, these doctrines indicate the empirical basis of a "dynamic theory of life." We must recognize the existence of infantile sexuality. Parents and teachers must recognize the requirements of nature. The greatest effort of the individual in life is what is called by Jung "self-sacrifice," the sacrifice of the childish feelings and demands and irresponsibility.

The work itself is in two parts, the first largely dealing with a phantasy system of one Miss Frank Miller (1906). It also deals with the "Hymn of creation" and the "Song of the moth," with comments on Christianity and mythology. This part of the work deals elaborately with phallic symbolism, with numerous ingenious quotations from the Bible, Faust, and other works. The second part of the work develops the widening of the concept of *libido* and its transformation, the "myth of the hero," the terrible mother, the "battle for deliverance from the mother," the dual mother rôle. (Here considerable use is made of Hiawatha.) "The object of psychoanalysis has frequently been wrongly understood to mean the renunciation of gratification of the ordinary sexual wish, while, in reality, the problem is the sublimation of the infantile personality, or, expressed mythologically, a sacrificing and re-birth of the infantile hero." One patient "makes use of classical forms. She dreamed of a mighty eagle which is wounded in beak and neck by an arrow. If we go into the actual transference phantasy (eagle equals physician, arrow equals erotic wish of the patient), then the material concerning the eagle (the winged lion of St. Mark, past splendor of Venice, beak means remembrances of certain perverse actions of childhood) leads us to understand the eagle as formation of infantile memories which in part are grouped around the father. The eagle, therefore, is an infantile hero who is wounded in a characteristic manner on the phallic point (beak). The dream also says, 'I have renounced the infantile wish, and sacrificed my infantile personality' (which is synonymous with, I paralyze it, castrate the father or physician)."

The notes on the work exhibit learning not only in psychoanalytic literature but also in psychiatric literature. There are also numerous references to American work; references to Greek mythology and to Christianity are also frequent.

As to dementia præcox, Jung notes that "it is extremely unfortunate that this malady should have been discovered by the psychiatrists, for its apparently bad prognosis is due to this circumstance." Asylum cases, Jung believes, are not characteristic of early forms frequent in general practice such as Janet has described under the name of psychasthenia. These cases, according to Jung, fall under Bleuler's classification of schizophrenia. In private practice Jung terms these introversion neuroses. Whereas transference is the characteristic feature of hysteria, introversion dominates in so-called dementia præcox. Jung appears to identify Janet's psychasthenia, Bleuler's schizophrenia, his own introversion neuroses, and Kraepelin's dementia præcox.

Ingenious observations abound. "Just as traces of memories long since fallen below the threshold of consciousness are accessible to the unconscious, so too there are certain very fine subliminal combinations of the future, which are of the greatest significance for future happenings insofar as the future is conditioned by our own psychology." Along some such lines might be explained the prophetic significance of the dream long claimed by superstition. If the scientific man of today is adverse to this line of thinking, he is merely over-compensating.

In the book just reviewed, Jung admits that he will be charged by some mysticism. This charge cannot be brought against Holt in his important work, "The Freudian Wish and its Place in Ethics" (5). According to Holt, Freudian is not synonymous with sexual and the talk about sexual in connection with Freud is another instance "of that infallible insistence of the cheap press and the vulgar mind to seize on unessentials." Freud has given to the science of mind a "causal category." The Freudian key is "the first key which psychology ever had which fitted." Holt believes it is the only key that psychology will ever need. Freud is making "comfortably established professors look hopelessly incompetent." Frivolous critics have dropped the remark that Holt's book deals neither with wishes nor with Freud. The serious basis for such a frivolous remark is that the doctrine of response and cognition first published by Holt in the *Journal of Philosophy, Psychology and Scientific Methods* (reproduced as a supplementary chapter in the "Freudian Wish") is a scientific concept having a quite non-Freudian origin. This supplementary chapter deals with what Holt calls the specific response relation and with cognition and response. It can be no duty of a psychopathologist to criticize this doctrine of behavior relations as cognitive. The sort of tendency which Holt represents is found in at least four groups of workers, the American realists, the English realists, the French and Russian objective psychologists, and the behaviorists. The Freudians themselves, Holt thinks, probably also exemplify the tendency, to say nothing of pragmatists and radical empiricists. As far as the behaviorists are concerned, Holt regards Bethe as a good example and states that his description of the complex behavior of ants and bees is itself a description of consciousness.

To return to the psychopathological interest of the book, we discover that a wish is for Holt "any purpose or object for a course of action, whether it is being merely entertained by the mind or is being actually executed." A wish is dependent on a motor attitude of the physical body, which goes over into action and conduct when the wish is carried into execution. Freudian psychology deals with an interplay of wishes and is accordingly a dynamic psychology. The energy, corresponding to the term *dynamic*, is for Holt in the nervous system itself, since the nervous system "establishes the motor attitudes and their conflicts and actuates the muscles to the performance of conduct."

A series of interesting examples of Freudian anecdotes and interpretations is given to illustrate the meaning of the term *wish*. The Freudian wish, according to Holt, "transforms the principal doctrine of psychology and recasts the science; much as the atomic theory and later the ionic theory have re-shaped earlier conceptions of chemistry." This so-called wish "becomes the unit of psychology, replacing the old unit commonly called sensation." "The advent of specific response or behavior is the birth of awareness" and therefore the birth of psychology itself. "Specific response is not merely in some random direction; it is toward an object, and if this object is moved, the responding organism changes its direction and still moves after it; and the objective reference is that the organism is moving with reference to some object or fact of the environment." In the pistol or the skyrocket, the process released depends wholly on factors internal to the factors released; in the behaving organism, the process depends partly on factors external to the mechanism. These external objects are as much constituents of the behavior process as the organism itself.

Specific response, identical with the Freudian wish, is "a course of action which the living body executes or is prepared to execute with regard to some object or some fact of its environment." "The essential physiological condition for thought is the lambent interplay of motor attitudes." As in some sense supporters of such a doctrine, Holt cites Spinoza, Herbert Spencer, James, Darwin, Jennings, Bethe, Sherrington. A few quotations will serve to indicate the further contents of the book. Thought is "latent course of action with regard to environment or a procession of such attitudes." "There are two elemental appetites: the nutritive (including that for oxygen) and the sexual; possibly more." The ways of meeting moral dilemmas are four: "One way is to resist the present dominations, which means to suppress the wish." "A second way is to forget (that is, to suppress) the righteous precepts learned." "A third way is no better; it is the way of those who undertake to follow both of two conflicting courses, the path of compromise." Dr. Jekyll and Mr. Hyde form an example. "But there is a fourth way of meeting a dilemma, a way that involves integration and not dissociation or yet suppression." "It consists in a free play of *both* the involved sets of tendencies, whereby they *meet* each other, and a line of conduct emerges which is dictated by *both* sets of motives together, and which embodies all that which was not downright antagonistic in the two." "Facts are moral sanction: and facts impose the most inexorable moral penalties." This suggests the Hegelian thesis and antithesis and synthesis, but according to Holt the similarity is superficial.

Another American book looking in the ethical direction is that of William and Mary Tenney Healy on "Pathological Lying, Accusation and Swindling" (4). This is the first of a series of criminal science monographs, being supplements to the *Journal of Criminal Law and Criminology*. "Pathological lying is falsification entirely disproportionate to any discernible end in view, engaged in by a person who, at the time of observation, cannot definitely be declared insane, feebleminded, or epileptic." The study is in line with the original studies of Delbrück in 1891 on "Pseudologia Phantastica." Note is made of the work of Ferriani, Duprat, and Stanley Hall on the general topic of lying. Brief analyses are offered of the cases of Delbrück, Köppen (1898), Risch (1908), Vogt (1910), Stemmermann (1906), Jörger (1904), Henneberg, Wendt, Bresler, Koelle, Belletrud, and Mercier (1910), Rouma (1908), and Meunier (1904).

Healy himself deals with twelve cases of pathological lying and swindling, of which Case 3 classically represents the type. "A woman of 27 years (usually claiming to be 17), during a career of 7 or 8 years has engaged in an excessive amount of misrepresentation, often to the extent of swindling. Alleging herself to be merely a girl and without a family, she has repeatedly gained protection, sometimes for a year or more, in homes where her prevaricating tendencies, appearing with ever new details, have sooner or later thwarted her own interests. By extraordinary methods she has often simulated illnesses which have demanded hospital treatment. For long she was lost to her family, traveling about under different names, making her way by her remarkable abilities and unusual presence."

There are nine cases of pathological accusation; six other instances of mental types are separately presented.

Pathological liars are found by the Healys to show the same traits in the laboratory as they do on the witness stand or in general social life. Some of the pathological liars are not greatly suggestible with regard to ideas of others. Hereditary taint is strong; at all events, the great majority of cases show striking defects in the stock. Eighteen or nineteen mentally normal cases were female. "A general observation by practical students of conduct, namely, that females tend to deviate from the truth more often than males, is more than thoroughly borne out here." The writers state that masturbation, including its indirect effect, particularly upon the psyche, appears to be a very important feature of these cases. "The early mental experiences of many of our group of mentally normal pathological liars have been shockingly bad." "No less than 8 of the 19 have had very early untoward sex experiences." "The fact that several of our cases started lying from the time when there occurred some experience accompanied by a deep emotional contest, and that this experience and the emotion were repressed seems to point clearly to the part which repressed mental life may play in the genesis." Four cases (1, 4, 7, and 19) have shown an immensely favorable outcome, and the years have gone by with nothing but steady improvement. The pathological liar should be directly met upon the level of the moral failures, and it should be made plain to her that these are known and understood. Instructive treatment should utilize the powers of the liar. There should be ample gratification in self-expression and in use of the imagination. One case in the literature is noted who found himself capable of "leading a blameless life by becoming a newspaper man." In fact, verbal fluency is closely related to pathological lying (Case 11). There are a number of cases cited of special language ability.

It is to be hoped that the work of the Healys will be continued in a long series of monographs, since by such work the points of view of medicine, psychology, and psychopathology will eventually infiltrate the courts and the preserves of criminology and even of penology. The laity are becoming interested in these matters. A lawyer, E. V. Mitchell, has published a small book, "Hospitals and the Law," valuable for its citation of numerous medico-legal cases (12).

Stephen Smith, under the title "Who is Insane?" (16), has published a work dedicated to the memory of William Prior Letchworth. Dr. Smith was commissioner in lunacy in New York from 1882 to 1888. This book is readable and anecdotic. "There is no sure sign of insanity." There are chapters on the derangements of the brain, on the periods of life, and on a variety of rather startling cures. During Dr. Smith's commissionership, mechanical restraint ceased. Dr. Smith thinks that an ideal arrangement of the ordinary state asylum would be to create the following divisions of administration: research, curative, industrial, custodial, and hospital divisions. He would have every patient on admission assigned to the research department. After satisfactory diagnosis, he would have the patient discharged or transferred to one of the other four divisions. The curative department he would have under the exclusive control of the research staff. He would have the research and curative departments practically one in organization, with an official head consisting of a board with an alienist, a physiologist, a pathologist, and a psychopathologist. There should be subordinate officers serving as field workers. Smith heads further chapters "Cure the Curable" and "Use the Usable." Smith commends psychopathic hospitals and similar improvements in the care and study of mental disease.

The first monograph of the Psychopathic Hospital in Boston is that of Professor Yerkes (22), "A Point Scale for Measuring Mental Ability" (R. M. Yerkes, J. W. Bridges, Rose S. Hardwick). This book is dedicated to the memory of Alfred Binet and Edmund B. Huey. Yerkes states that the suggestion for his type of scale was taken from the work of the late Dr. E. B. Huey. The Binet Age Scale with its several groups of measurements and its "all or none" method of giving credit was yielding less satisfactory information than the interests of the Psychopathic Hospital demanded. Yerkes preferred to use the Binet tests themselves rather than evaluate new material. He felt that it would be best to determine the value of the single-series and partial-credit ideas before attempting to develop a final form of point scale. Accordingly the materials deal with a pre-adolescent scale, rather than a universal scale. A final chapter, however, deals with proposals for a universal point scale, and I am informed that a scale suitable for adults has now been laid down by Yerkes and Rossy. Ten principles of a universally applicable measuring scale of mental ability are presented. No extended review of this work is here necessary, since the merits of a variety of scales are being rapidly evaluated in the literature. Use has been made of this scale not only as routine work with the Psychopathic Hospital patients but also in practice with candidates for employment at the Psychopathic Hospital. It is a question whether the scale or some similar product may not be superior to methods used by civil service boards for evaluing their candidates.

The publications of the Psychopathic Hospital in Boston other than the monograph just mentioned consist of numerous short papers, some of which are of psychopathological interest. The most interesting are probably those which deal with the test proposed by Prof. E. G. Martin for determining the minimum faradic sensibility of subjects. This work in the Psychopathic Hospital has been carried out by Dr. G. P. Grabfield. The results have been of some prognostic value in alcoholic cases, since a persistence of hypesthesia, even when other symptoms have apparently cleared up, seems to argue a prolonged danger zone. The depressive phase in manic depressive psychosis appears to show a heightened threshold, whereas depressions in neurasthenia and the psychoneuroses have failed to show such.

Articles on the optic thalamus (18) by the reviewer contain some points of psychopathological interest. The motor or psychomotor symptom *cerea flexibilitas* or catalepsy seems to be, according to the suggestions of the former paper, possibly a disorder of kinesthesia. The possibility that the thalamus is an appropriate site for subcortical focalizing of the attention is developed in the paper on the optic thalamus.

The *Transactions of the American Medico-Psychological Association* (1) contain the annual address by D. S. Freeman, Ph.D., now a practical newspaper man, on "Publicity and the Public Mind," written on the basis of a variety of recent works on social psychology. Other work of interest to psychologists concerns out-patient work in Massachusetts State hospitals and a survey of defective delinquents in Massachusetts institutions, both by A. W.

Stearns. H. J. Berkley contributes a discussion of the psychoses of the "high imbecile." There are a number of discussions of the occupation of patients but none of these take up the matter from the psychological point of view, which seems to be thoroughly neglected in precisely the region where it might have routine application, namely, in insane hospitals.

The Proceedings of the Conference on Charrties and Correction at Baltimore (3) contain remarks on psychology, notably in the section on state care of the insane, feebleminded, and epileptic, by Fernald, Meyer, Goddard, Southard. Meyer believes that the problem of the prevention of mental defect, mental disease, might deal with: first, the difficulty of finding one's level; second, alcoholism; third, venereal disease; fourth, heredity. Hospitals, dispensaries, mental hygiene organizations, school physicians, psychopathologists in juvenile courts, boards issuing working permits for minors under the age required by child labor laws, etc., are active agencies.

Abraham Flexner contributed an interesting paper on "Is Social Work a Profession?" He comes to the conclusion that social service is rather a mediating order than an originating agency. A decision upon this question is of the greatest importance, as the reviewer knows from personal experience; and the relations which the sociologist or specialist in social effects, the practical social worker, the academic psychologist, and the practical psychopathologist, present in the practical management of agencies dealing with psychopathic cases need to be worked out with the greatest care in the next few years.

Laehr (9) briefly considers "Psychopathia Gallica" of Löwenfeld (11), speaking of the incredible misconstruing of Germany and the unmeasured hatred of German people which the French especially have shown. It was Groddeck who, in 1848, spoke superficially of what he called *morbus democraticus*. Now Löwenfeld has taken up the task. To be sure, says Laehr, Löwenfeld has not followed the fashion of Toulouse, who has regarded the Belgian alleged facts as characteristic phenomena of mob-psychology and has described delusions of grandeur and persecution on the part of the German people. Löwenfeld considers this *psychopathia gallica* as a disease whose prognosis is not unfavorable in case the war ends as the Germans hope. The Dreyfus case is thought to be an ante-bellum epidemic of mental disease in France. The revenge idea has gone to such a point as to permit the vassal relation of the republic to absolutistic Russia. This revenge idea has, in fact, caused in France a *Minderwertigkeit re* intelligence and morals.

Benda (2) has also launched a question in a newspaper: "Ist das französische Volk zurechnungsfähig?" Löwenfeld and Benda agree that the French people have developed the revenge idea in the so-called *überwertig* manner on an hereditary basis, Löwenfeld regarding this basis as psychopathic and Benda regarding it as hysterical. The revenge idea is regarded as morbid because there is no factual basis for the judgments rendered. Benda regards the leaders of the French people as responsible for the situation. Löwenfeld regards the whole people as victims of psychopathic *Minderwertigkeit.* Laehr regards the hypothesis of the morbid mental state of the French people as unfounded. Laehr thinks the idea of *psychopathia gallica* would best not be regarded as more than a clever play of thoughts, partly on the ground that if the French people are to be regarded as suffering from disease then they would be the object of compassion at the end of the war. There should be neither compassion nor revenge at the end of the war.

Sokolow of Wil, Switzerland, contributes two articles (19, 20) on experimental auditory hallucinations brought about by peripheral stimuli. He concludes that auditory hallucinations may be brought about by acoustic and other stimuli although acoustic stimuli are more effective. The first experiments indicated that the pitch of the stimuli and of the hallucinations varied directly, but later experiments seemed to indicate that this result was to be found only in persons with a certain musical ear. He found that the rhythm of the hallucinations follows very closely the rhythm of the stimuli; that in the case of auditory hallucinations produced electrically there was a certain dependence of the hallucinations upon the nature of the current employed; but that there was no relation between the intensity of the current and the pitch of the hallucinatory words. Full protocols are given.

Lomer (10) continues previous work on the graphological signs of imbecility, classifying the deviations from normal under a variety of headings, such as tremor, oblique writing, large handwriting, etc. (nine headings), with investigations in 19 cases. He regards a number of these deviations as having mental value, being primary properties of handwriting. Secondary and tertiary groups of the peculiarities permit some conclusions as to dementia and its course. The writer regards his conclusions as provisional.

Raecke (15) calls attention to certain situation psychoses (a term proposed by Siemerling and favored by Stern), stating that in the course of a dementia præcox there may occur some complexes just as clearly psychogenic in origin as in hysteria—complexes produced by the situation. It would be unfortunate to call prison psychoses psychoses of degeneration if certain cases in the prison group should turn out to be truly situation psychoses. These situation psychoses remind one of the symbantopathies of Kraepelin above-mentioned.

Stransky (21) re-introduces the topic of transitivism (Wernicke), presenting an example of what he calls associative or noöpsychic transitivism, not because the case failed to show affective disorder (failed, that is, to be thymopsychic) but because it was predominantly an associative disorder of a nature termed by Stransky *paracritical.* There is probably a transitivism of, as it were, a paralytic nature in which associative power is lost, and another form discussed by Pick in which the disorder is "productive." The mistaking of personalities of schizophrenia is regarded by Stransky as of another order, in which ataxia or incoördination is the fundamental difficulty. Probably Wernicke's transitivism as originally described belonged to the schizophrenic group. Although Stransky chiefly considers the noöpsychic form of transitivism, he regards the emotional or thymopsychic form as more frequent.

Pick (14) discusses echolalia, remarking on the new light thrown into the aphasia doctrines by the celebrated chapter of James's "Psychology," entitled "Stream of Thought." Pick regards echolalia as due to the loss of inhibitions rather than to irritative phenomena.

The *Revue Neurologique* (13) in a special number presents numerous analyses of the literature of the nervous system in the war, including articles on the psychoses by Régis, Bechterew, Lugaro, Ballet, and Grasset.

Attention may be called to the excellence of the reviews of articles on psychology and general psychopathology in the *Zeitschrift für die gesamte Neurologie und Psychiatrie* (Section 3 of the Referate).

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NOTES AND NEWS

The present number of the Bulletin, dealing with psychopathology, has been prepared under the editorial direction of Dr. E. E. Southard, of the psychopathic department of the Boston State Hospital.

Reprints of Professor Knight Dunlap's article on psychological terminology have been sent to all members of the American Psychological Association by the Committee on Terminology.

The following items have been taken from the press:

At Stanford University Professor Lillien J. Martin has been made professor emeritus of psychology.

Professor Raymond Dodge, of Wesleyan University, has been appointed Ernest Kempton Adams research fellow of Columbia University, for the year 1916–1917.

At the University of Chicago Dr. Harvey Carr has been promoted to an associate professorship and Dr. Joseph W. Hayes to an assistant professorship in psychology.

The department of psychology of the Johns Hopkins University will be divided temporarily. One part under the direction of Professor J. B. Watson, will be housed in the Phipps Psychiatric Clinic, the other part will be removed to the new academic building at Homewood, and will be under the direction of Professor Knight Dunlap. In the planning and in building the Phipps Psychiatric Clinic provision had been made for a psychological laboratory, but the laboratory was not established.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

VISUAL SPACE

BY MABEL C. WILLIAMS
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Articles on visual space appearing during the last two years may be classified roughly into three groups: discussion of some of the less well known illusions, stereoscopic vision, and philosophical interpretations of the problem of space.

As early as 1858 Panum described a certain solid or stereoscopic effect with the fusion of the homonymous images of a single line and of two lines close together. Henning (4) subjects this phenomenon to a careful analysis, both critical and experimental. He defends Hering's explanation that positions in space correspond to the retinal areas stimulated. Jaensch on the other hand explains the illusion as the result of the shifting of the attention and the corresponding "impressiveness" of the lines attended to. Henning devotes long pages to the refutation of Jaensch's conclusions and describes some ingenious experiments. Müller (6) fills one whole number of the *Zeitschrift* with an exhaustive analytical discussion of the Aubert phenomenon, the apparent change in the direction of a vertical line with change in the position of the head. He distinguishes between the real Aubert effect, the turning of the line in the direction opposite to that in which the head is turned, and a less marked turning of the line in the same direction in which the head is turned. No very extensive experimental data are presented. Much emphasis is placed upon individual differences of his observers, and they are grouped in representative types. Among factors which probably contribute to the illusion are the harmonious or antagonistic positions of the head, eyes and trunk, together with the change in position of the retinal elements stimulated. Various subjective or objective associates of the line tend to influence its apparent position. Previous work upon this illusion is summarized and criticized.

Zoth (12) has devised a simple little instrument, a "plastoskop," to use as an aid in bringing out relief in paintings. It gives better results than the usual method of viewing the picture monocularly through the hollowed hands. The little instrument, which is made of leather and is collapsible, is convenient and since it can be carried in the vest pocket it may always be at hand. Benussi (1) reconsiders the theory of Witasek (*Zsch. f. Psychol.*, 50, 161–218) that images from the same fixation point in space do not fall upon corresponding retinal points. Witasek calls this the "monocular localization tendency." Benussi has devised an interesting haploscope and concludes from his experiments with it that the effect in question does not arise when all forms of eye movement are excluded. Witasek (11), commenting upon Benussi's results, admits that the law is not upheld but reserves explanation until after further consideration. Edridge-Green (2) has summarized his own paper: Perception of binocular relief and solidity is not dependent upon the combination of images falling upon disparate retinal points; two photographs from the same negative will combine and give relief and the result is often as good as with real stereoscopic views; if one half of an ordinary stereoscopic picture is suddenly covered with white cardboard, relief remains, but vanishes when the eye on the side covered is closed; in ordinary binocular vision, the right eye dominates for the right side and the left for the left side of the combined field, unless the position of two points in space is noted, when one eye, usually the right, dominates; the mind projects outward the appearance of a solid object which would give rise to the images falling upon the retinas; when the mind is not able to project the image of an object in space which would produce the two images, double images or binocular rivalry takes place; binocular struggle is absent when the two inner halves of the two pictures are covered, and the outer halves are combined. Grünbaum (3) commenting upon Edridge-Green's paper refuses to dismiss so summarily the disparate images, and also refuses to accept any wholly psychological explanation of the perception of the third dimension, such as he presents. In a paper read shortly before his death, Professor Pierce (8) reports some very interesting conclusions from experiments upon binocular stereoscopic fusion.

"We have no right to expect that persons will see certain stereoscopic solids merely because the appropriate diagrams are placed before their eyes." Four causes operate to make the stereoscopic effect uncertain: (1) visual habit may bring it about that monocular vision is superior to binocular, as in right-eyed people; (2) there may be a "cramp" of the muscles of accommodation and convergence and the usual synergy of accommodation and convergence must be broken up, especially in free stereoscopy; (3) each eye may receive its appropriate stimulation but the various impressions fail to fuse; (4) a strong and unfavorable pre-perception may be at work, a sort of cramp of apperception as it were. These four explanations are all supported by experimental evidence.

The contributions of Selety (**9**) and Henry (**5**), since they are concerned with philosophical interpretations of the space of geometry, are not of great vital interest to the psychologist and they do not lend themselves readily for summarization. Münsterberg (**7**) gives a short account of the elements of space perception and asserts "that there is no perception of space in which muscle activity is not originally involved." Titchener (**10**), who also gives a short but comprehensive account of the factors in visual space, adopts a more nearly psychological point of view when he says that "the binocular picture carries the immediate meaning of depth or voluminousness."

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AUDITORY SPACE

BY DANIEL STARCH
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The experiments conducted by Geissler (3) were designed to ascertain in a quantitative manner the effect of a definite expectation of the sound from a certain direction upon the accuracy of locating the sound. The tests were made with twenty observers. The sound stimuli were given at a distance of 75 cm. from the center of the observer's head and on a level with the ears at points 30° apart around the entire circumference. The observers were asked to direct their attention to certain regions and the stimuli were given either in that general region or in the opposite region. In some trials the attention was left undirected. The results indicated that the localization is either enhanced or diminished by almost half of the original error according as the expectation is to or away from the regions of the stimulus-positions. Certain other observations made by Geissler, such as the slightly greater accuracy of the women over the men and the slightly greater accuracy on the left side than on the right, are uncertain for the present number of observers.

The problem of the investigation made by Baley (2) was to determine the accuracy of localizing a group of tones presented simultaneously, a part of the group to the right ear and a part to the left. The groups of tones varied in number from four to ten and were produced by organ-pipes and whistles which were located in a distant room. The sounds were conducted in tubes directly to the ears. The tests were made with three well-trained observers. The response consisted in stating which of the tones were presented to each ear. Baley found the tones were referred correctly and quickly to the proper ear.

Anderson (1) working both out of doors and in a room found that the direction of the sound has no effect upon the accuracy of the discrimination of the pitch of the sound.

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SPACE ILLUSIONS

BY HARVEY CARR

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Pierce (4) asserts that for him the proofreader illusion is not visual or perceptual but rather apperceptive and judgmental in character. The error consists of a wrong auditory or vocal response to the visual given; the word is seen correctly but is read wrongly. The phenomenon is termed an imagery illusion. It is noted that this illusion is difficult to study as it occurs only with rapid reading and disappears with critical observation. Pierce suggests a threefold classification of illusions on the basis of their stability under critical examination.

Hennig (3) reports a new illusion. A wooden picket fence observed through a similar one suffers certain distortions, the width of the wooden strips as well as the space between them appears magnified about three fold. To obtain the effect the distance of the observer from the nearer fence must be at least equal to that separating the two fences. When the distant fence is perceived through an iron fence consisting of intersecting diagonal rods, the wooden panels present a mosaic appearance of alternate light and dark rhomboids.

The article of Zahlfleisch (5) consists of a critique of Vaihinger concerning the interpretation of Kant in relation to the concepts of error, reality, illusion and hallucination.

The first phenomenon reported by Arps (1) is an illusion of falling with accompanying terror and pains in the head experienced by a normal boy after retiring but before falling asleep. The occurrence of the illusion apparently depended upon the nature of the boy's activity during the day. Illumination in the room tended to prevent and dispel the illusion and in time resulted in a permanent cure. It is suggested that any intense distracting stimulus would have accomplished the same result. His second illusion concerns a young girl who suffered intermittent spells of micropsia, a tendency for fixated objects to decrease very noticeably in size. No defect in vision was detected by oculists. The illusion was dispelled by fixating a moving object. It is suggested that the illusion is due to imperfect control over convergence.

Hayes (2) investigated an illusion noted by astronomers, the tendency to overestimate the luminosity of the lower of twin stars.

Two lights were used whose size, color, distance apart, and meridional location were varied. The disparity was limited to foveal vision and the vertical meridian, and the intensity of the lower light was overestimated in these conditions. The illusion was present for both monocular and binocular vision and persisted with practice. Its degree depended to some extent upon the color, size, and distance apart of the two lights. No corresponding size illusion was discovered.

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SUGGESTION

BY WALTER DILL SCOTT

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In performing the Ink-Blot experiment on imagination Feingold (1) directed each subject to "saturate" his mind for fifteen seconds with the sight of a picture postal card. The object of the experiment was to discover: (*a*) "To what extent can suggestion control or direct imagination?" and (*b*) "Is suggestively induced imagination more or less fertile than free imagination?" The conclusions were: (*a*) Visually induced suggestion can direct visual imagination about 24.5 per cent. of the time. (*b*) Such suggestive stimuli tend to diminish the fertility of the imagination about 29.4 per cent. of its normal range.

Town (7) made a systematic attempt to discover the change in suggestibility with a change of age. For this purpose she selected one group of forty boys, aged twelve, and another group of thirty boys, aged fifteen. Except for age the two groups were assumed to be homogeneous. Five of the best known tests on suggestibility were applied individually to each of the seventy boys. Her conclusions are: "That average boys of twelve and fifteen years of age are highly suggestible, that the difference in suggestibility due to the age differences between twelve and fifteen in average boys is slight, that to secure an estimate of an individual's suggestibility it would be well to use a series of tests each affecting the suggestion through stimulation of different senses, that repetition has little if any effect on the strength of a suggestion." Like previous experimenters, she found that the subjects shown to be highly suggestible in one test were not the most suggestible in other tests. In all but one case the correlation between tests is negligible.

In recent literature we have several reports of attempts to analyze and to standardize the most favorable conditions for utilizing suggestion in influencing men. Gowan (2) discusses the necessity of paying attention to the following: the prestige of the suggestor, the suggestibility of the subjects, the duration of the suggestion, and the volume of the suggestion. Hollingworth (3) presents the following laws of suggestion: It is important to suggest no rival idea, to make the suggested idea to appear to be of spontaneous internal origin, to make use of ideas of intrinsic intensity, to use positives rather than negatives, to secure complete attention, to utilize the prestige of the suggestor, to avoid internal resistance, and to make use of repetition in presenting the suggestion. Scott (5) attempts to catalogue the conditions in which suggestion is more effective than argumentation, also to describe the conditions for making suggestions successful. Münsterberg (4) analyzes the points of attack in making a suggestion effective: "One way is to strengthen the suggestive power of the idea by reinforcing it; the second to weaken the opposing idea directly by undermining it; and the third way is to heighten the suggested idea and to weaken the opposite idea indirectly through the suggestible attitude. All three methods can easily be combined." Wallas (7) illustrates the despair to which a writer is driven if he makes use of an unsatisfactory definition of suggestion. "It would tend to clearness in psychological statement if the use of the substantive 'suggestion' were abandoned, and if the adjectives 'unconscious,' 'subconscious,' or 'incompletely conscious' took its place."

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TESTS

BY FRANK N. FREEMAN

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The past year has witnessed the culmination of constructive labors which represent two contrasted points of view in reference to the methods of testing for mental deficiency. The type of test series which is represented in the Binet-Simon scale has been perfected and enlarged in the revision of the Binet scale by Terman and his co-workers at Stanford (20). In this work the principle of classification by age groups is maintained, but the number of tests is enlarged and all of the tests are subjected to severe standardization. The Yerkes-Bridges scale (26), on the other hand, eliminates the principle of age classification in the scale itself, and hence finds it necessary to adopt this principle in the use of age norms as means of interpreting the results of the tests. In contrast to the Stanford revision the Yerkes scale uses fewer rather than more tests, but allows for a variety of grades of answer to each test. Future experimentation will have to determine whether it is better to include the age principle in the tests themselves or in the interpretation of their results.

In the monograph of Miss Schmitt (16) there is an elaborate critique of the Binet tests based upon their use, an attempt to standardize the Healy-Fernald tests and, as the most original part of the monograph, the analysis of performance in the school subjects as a means of indicating something regarding the possible mental advancement of the child in the school. Other discussions, critiques and reports upon the application of the Binet Tests are made by Descoeudres (3), Keller (8), Pintner and Patterson (14) and Porter (15).

Four of the papers bear upon the moot question of tests in vocational guidance. Woolley (24, 25) gives a large amount of data resulting from the study of the children who received work certificates in Cincinnati as a part of the work of the Vocation Bureau. Mrs. Woolley has pursued the method of giving each child a large number of tests for the purpose of exploring broadly his intellectual ability rather than for the purpose of attempting to find specialized capacities. The results are formulated in a very careful manner in order to facilitate placing any individual child in the general scale composed of the results in all of the tests. Hollingworth (7) and Kitson (10) discuss the various possible methods of psychological analysis of vocational ability. They agree in their theoretical conclusions with the practice of the Vocation Bureau in placing little faith in the attempts to make fine discriminations among types of ability and in placing greatest reliance upon the ability to determine the candidate's general intelligence. This general mental examination is also the method pursued by Scott (17) in formulating tests for the selection of salesmen.

Kelley (9) has carried the statistical method of correlation forward a step by developing the use of the regression equation applied to individuals, rather than simply making a formulation of relationships by groups. He has developed the method by which he considers it possible to so apply this equation that the future standing of an individual can be calculated on the basis of his work in earlier periods of the school, or upon the basis of tests.

Single tests or groups of tests have been standardized by the New York State Board of Charities (1), Bateman (9), Goddard (10), Goudge (11), Haines (12), Pintner (13), Trabue (21), and Travis (22).

Schulhof (18) has worked out a very elaborate form of tests by means of definitions and of questions such as "What is such a thing for?" "What is the difference between two things?" or "Why is such and such a thing done?" No data are given of a statistical sort of the results of this test. It is intended to be applied in the diagnosis of intelligence.

Peterson (12) has given an elaborate and useful description of methods of testing for vision and hearing.

Whipple (23) has published the second somewhat enlarged edition of the later part of his *Manual of Mental and Physical Tests* in a separate volume. The general nature of the treatment and the content are in the main the same as in the first edition. The book is brought down to date and revised in minor details.

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SPECIAL REVIEWS

An Introduction to the Study of Colour Vision. J. H. Parsons. Cambridge: University Press; New York: Putnam's, 1915. Pp. viii+308.

This book of Dr. Parsons gives an admirable presentation of the facts of light-sensation (that is, of color-sensation, both chromatic and achromatic),[1] and it will be found to be invaluable in those laboratories where color knowledge has hitherto been confined to the facts given prominence to by Professor Hering. In other words, the splendid accumulation of scientific knowledge which has issued from the laboratories where the Helmholtz theory rules is here given a proper setting forth. With this book on his shelves, unique in its completeness as regards the science of the subject (for applications of color it should be supplemented by the new work of Luckeish), it ought to be impossible for any director of color investigation to proceed in ignorance of half the field of ascertained fact in his subject.

A good test-object as to a writer's comprehension of the fundamental facts of color consists in his use either of the terms protanopia and deuteranopia, or of scoterythrous and proterythrous, for the two types of yellow-blue vision, and of the corresponding terms for the various forms of anomalous tetrachromatic vision studied by Donders and by Lord Rayleigh (and exhaustively by König). His use of the latter two terms indicates that he knows no more than that, of the two types, one has the red end of the spectrum darkened, the other has not; but if he uses the former two terms, it is apparent that he is aware of the reduction to accurate measurement of these two forms of dyschromatopia. His color terminology is here at once illuminative as to his state of mind. Dr. Parsons meets this test. For daylight vision and for low-light vision respectively he uses the terms photopia and scotopia; these terms should become, like protanopia and deuteranopia, protanomalous and deuteranomalous, the standard expressions.

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[1] See Psychol. Bull., February, 1913, for my suggested color-terminology. Thus I propose to use the ambiguous word *color* in the wider of its two present significations, and to use the term chromatic sensation or chroma in the sense of color proper. For instance, the dealers in wall-papers are correct when they use the term *monochrome*, except in the case of papers of different shades of grey: for these we ought rather to say *achrome*, since they are without chromatic character. Grey is a *color*, but it is not properly a *chroma*. Thus a *color* theory is a theory which purports to account for the achromatic as well as the chromatic sensations.

Dr. Parsons's book comes nearer to giving an adequate discussion of color theories than any book on the subject that has yet appeared. Though I say nearer, I do not mean that it comes very near: one is tempted to believe that, as all philosophers are born either Platonists or Aristotelians, so all psychologists are born either Helmholtzians or Heringians—and this means incapable of understanding the point of view in the one case of Hering, in the other case of Helmholtz. In other words, the psychologists have long since forgotten the existence of the Helmholtz theory (in which they are quite correct), but they have unfortunately thrown away therewith the Helmholtz facts. The physicists on the other hand are not yet aware of the existence of the Hering theory: Dr. Nutting, for instance, in his book on *Applied Optics*, says: "According to the commonly accepted theory of color vision," meaning the Helmholtz theory. Professor Woodworth, in addressing the Society of Illuminating Engineers, in exactly the same way treats the theory of Hering as the commonly accepted theory, and that of Helmholtz as not existing (in spite of the fact that his audience consisted of physicists, who were sure to be followers of Helmholtz). The followers of Hering do not even take the trouble to say that they consider the work on color sensation which issues from the laboratories of the physicists and the physiologists unconvincing, and to point out their grounds for not accepting it: they are content to ignore it. There is probably no other field of science (nor ever has been) where two different schools can live side by side—in closely contiguous university buildings—without being aware of each other's existence. Usually it is the case that possession of the munitions of war is sufficient to determine the fate of combatants, and here the great color-mixing instruments are all in the hands of the anti-Heringites; but in this instance the possessors of the inadequate apparatus have not always been able to recognize their inevitable defeat.

Dr. Parsons makes a brave effort to give open-minded treatment to the two points of view in color theory, but as matter of fact he never attains to a real, ingrained, feeling for the psychological aspect of color-sensation—that means the recognition of the unitary character of yellowness and of whiteness (Mach and Leonardo da Vinci). He gives a very good showing up of the incongruities and the illogicalities of the theory by which Hering attempts to account for these unitary sensations, but he fails to notice that the view of Schenck (which is usually affirmed to be an elaboration of the Ladd-Franklin theory) is in reality a return to the pre-psychological dark ages of Helmholtz. Schenck states explicitly that there is no need of accounting for the yellowness of yellow and the whiteness of white, that these characters are imaginary, and immaterial. The Ladd-Franklin theory aims to unify and to offer a substratum for both the psychological facts of Hering and the physical-stimulus facts of Helmholtz; by means of a single, simple, photochemical hypothesis it accounts at once for (1) complementation (where we should have the yellow-blues we get whites), and for (2) the development of the color sense (as exhibited in defectives, in animals, in the periphery of the normal eye, and in normal scotopia). Of these two features, Schenck adopts one (the second), but rejects, although it lies at his hand, the other (the first), for the reason that he is too unpsychologically minded to feel the necessity for it. And, as regards this character, Dr. Parsons, I fear, is in the same boat. The fundamental error of his way is exhibited when he maintains that Helmholtz has *proved* that vision is trichromatic (and hence that a tetrachromatic theory, like Hering's, or mine, is impossible). But here comes in evidence the fatal danger of an erroneous terminology. What Dr. Parsons means is that vision is capable of being reproduced by less than all the rays of the visible spectrum—by no more than three of them, in fact. This character of vision may be called its three-stimuli character, or equally well, its three receptor process character, but it has nothing to do with the number of independent *chroma-sensations* which succeed, in the end, upon the retinal photochemical processes,—these are four in number. The three-stimuli character of vision receives its diagrammatic representation in the color triangle, which is nothing more than the expression, in terms of trilinear coordinates, of the simple facts of "matching by mixtures." The tetrachromatic character of vision may be seen diagrammed in what I have called the quadrigeminal color area.[1] The matters which are under discussion between those who hold by the Hering and by the Helmholtz facts respectively are so fundamental that until they are reconciled in a theory which envelops them both (as, *e. g.*, the Ladd-Franklin theory purports to do) minor attempts at giving *ad hoc* "explanations" of disconnected phenomena are a sad waste of time. It is, of course, a keen logical pleasure to show up, at length, the futilities of, for instance an Edridge-Green, but a text-book ought not to be unnecessarily cumbered: such matter as this is sufficiently presented in the pages of a review.[1] A discussion of the theories of Pauli and of Bernstein, for instance, would have cast much more light on the true nature of the requirements of a color theory.

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[1] *Am. Encyclop. of Ophthalmology*, Art. Color Theory, and *Psychol. Rev.*, May. 1916.

But in spite of these fundamental insufficiencies, one can only be grateful to Dr. Parsons for his indispensable book.

CHRISTINE LADD-FRANKLIN

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Life and Human Nature. B. FULLER. N. Y.: Longmans, Green.

This very readable book much resembles some of the later productions of Lord Avebury and is typical of a sort of literary work which appears chiefly in England. The author is a colonial administrator, cultured and trained, practical, abounding in common sense, with shrewd observations on life, tolerant and openminded, conservative and orthodox, a reader of books on science and philosophy but without technical tastes or training. The book is very readable, though the many statements of controverted questions which are given as if there were no two opinions, and the absence of references, will not only detract from the value of such a work for the expert, but will also have a tendency to mislead the untechnical reader.

There are three parts, of which Part I is the longest, wherein is treated, under the heading Attributes of Life, a list of topics such as, Change, Sensation, Reaction, Instinct, Memory, Habit, Imitation, Consciousness, and Volition.

While most of the positions are well taken, there are not wanting instances of slips and offenses against logic. In the discussion of sensation there is a frankly solipsistic position assumed, in which the world is described as "like the whorls and eddies we see when we press hard upon our closed eyelids." Out of this confusion "the brain" conjures up "shapes and colors, sounds and solidity, which have no more resemblance to the reality than the notes of a music box resemble the machinery." We live in the midst of the unknown. This surely leaves our knowledge in a very unsatisfactory condition, but the matter is cleared up in the next paragraph when we are told that our guide is perception, and not sensation, perception being "sensation adjusted in the light of previous experiences." It is difficult to see how one deception would be any less misleading for having another deception immediately preceding.

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[1] Dr. Parsons wrtes me, in reply to my protest on this point, that he has been obliged to take into account the low state of knowledge regarding color among the ophthalmologists in England.

Among the instincts are suggested chilliness, ingenuity, declamation, prostration, justice, honesty, truth, and asceticism. "Both horses and dogs appear to possess a sense of justice." Every quality must be present in the lowest animals if it is in the human being. The only alternative would be special creation by divine power, which he rejects. The author is here reflecting the position of Bateson, who is mentioned in the preface, but it seems that the large use which he makes of the ideas and concepts of Bergson would have had more influence in presenting a third alternative.

The influence of Bergson is very obvious. In the erection of life into a metaphysical entity, and even to the detailed picture of the conflict between life on the one hand and matter on the other, the obligation to Bergson is extremely direct. It is apparent that the various positions have not been rigorously thought through. It is probable that the author would not care to do so.

Part Two is devoted to a discussion of the Constraining Influences on Human Nature, Race, Environment, and Culture and the wide experience and acquaintance with the peoples of Europe and Asia make this a very readable section. The Third Part is taken up with Human Achievements, Social Progress, Material Progress, Modern Economics, and Modern Politics. It is written from the standpoint of a conservative Englishman before the war. What he would write now, it would be interesting to know. At all events it is not psychological material and should not occupy any more of our space.

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The Freudian Wish and its Place in Ethics. E. B. HOLT. New York: Holt, 1915. Pp. vii+212.

For psychology the value of this book lies chiefly in the endeavor it makes to advance the principles of purposive motivation in its purely behavioristic sense. To accomplish his end the author calls to his aid the purpose or "wish" of the Freudian psychology, clothes it in some new regimentals, and presses it into service under the emblem of the behaviorists. He finds it to be the "first key which psychology has ever had which fitted" and, in his belief, "it is the only one that psychology will ever need." The "wish" is discovered as the *élan vital* which rejuvenates a static psychology; it is the underlying motive for movement and action; and thus it becomes the ultimate "causal category" for behaviorism.

In the first chapter of the four, the dynamics of the Freudian doctrine is epitomized and exemplified with a wealth of illustration which comes, for the most part, from the author's own experience. The very first few pages give us the concept of the "wish" as "any purpose or project for *a course of action*,[1] whether it is being merely entertained by the mind or is being actually executed"; it is "dependent on a *motor attitude* of the physical body, which goes over into overt action and *conduct* when the wish is carried into execution." In developing this aspect of purposive initiation of conduct, the book affiliates itself to that group of publications which have recently attempted to reinstate the excommunicated "soul" into the good graces of the discipline. "The living body through a long process of organization has come at length to 'embody' purpose. But the soul is of course always and forever the *purpose* that is embodied, and not the mere matter . . . that as a mechanism [it] embodies." The main portion of the chapter busies itself with applications of the Freudian interpretation to the dream, to the manifestations of wit and humor, to slips of tongue and pen, and to apparent transference of thought.

"The physiology of wishes and their integration" is the heading of the second chapter. In the foregoing section with one or two exceptions the author has not deviated from the current Freudian doctrine. At this point, however, probably in order to bring the teachings of Freud in accord with the assumptions of the behaviorists, a marked divergence from the orthodox rendering is noticed. The "specific response" of the organism and the "wish" "as Freud uses the term" are identified. Either may now be defined as "*a course of action which the living body executes or is prepared to execute with regard to some object or some fact of its environment.*" A doubt, we think, may justly be raised as to whether Freud would recognize his "wish" in this guise; certainly most writers have interpreted Freud otherwise. Freud himself speaks of "disturbing thoughts," of "feelings" and "emotions," of the "psychic life," of "the intention of the repressed material to come to conscious expression," and says that all faulty or chance actions may be referred "*to unwelcome, repressed, psychic material, which, though pushed away from consciousness, is nevertheless not robbed of all capacity to express*

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[1] The italics are everywhere those of the book.

itself."[1] But Holt insists that "in the view now before us, consciousness and 'the subjective as such' are done away with." Consciousness is "the relation between the living organism and the environment to which it specifically responds" and "*thought is latent course of action with regard to environment*," "it is often a mere irrelevance, a surface embroidery on action." But does not the history of the reaction experiment prove the reverse? As long as the outward behavior of the organism in terms of reaction-time was the only psychological criterion used, practically no progress in the interpretation of action was made; it was left for introspection to reveal the *Aufgabe*. The author's exposition of his point of view is elaborated in an appended essay recently published in periodical form. A review of this article needs more space than can be given here; its tone is clearly in a different key from that of the rest of the book; and its appeal is to the more seriously minded philosopher. We cannot refrain in passing, however, from expressing our surprise at the author's apparent inconsistency when he endeavors to argue away introspective evidence by citing a quotation from James which is based on introspection (p. 176).

With the "wish in ethics" and "some broader aspects of the Freudian ethics," the topics of the third and fourth chapters, we are here not much concerned. Suffice it to say that the author contrasts the "discriminating" conduct, in which intelligence is brought to bear on the situation, with the "suppressed" and "dissociated" type, in which "wishes" are suppressed without reason; "truth is the sole moral sanction." To have a "free-will" means to have as few suppressions as possible; the man who in his conduct follows the teachings of a discriminative understanding is the good man.

In many ways the author is certainly to be congratulated on the product of his thought and pen. The elements that are common to the Freudian and behavioristic doctrines are well brought out, and the only weak point lies where the danger lies—in the distortion of concepts to make them fit. A difference of opinion is, moreover, no serious charge against an author or his book. To the reviewer's knowledge, nothing in psychology has recently been written which is more stimulating and more readable; the author's fund of personal illustrations and his clearcut presentation of the theme do much toward a keen and renewed interest in things Freudian.

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[1] *Psychopathology of Everyday Life* (trans. by Brill), 1914, pp. 302, 326, 330, 332, 338.

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La psycho-physiologie de Gall: Ses idées directrices. C. Blondel. Paris: Alcan, 1914. Pp. 165.

This small volume is an attempt to rehabilitate Gall who was the founder of the modern doctrine of cerebral localization, but who has suffered, some believe, because of the almost exclusive linking of his name with the subject of phrenology. Blondel quotes the main points of Gall's works, and collects statements from different parts to show that Gall's contribution was not only of value but one which in many respects is allied to the views of the present day. Besides the introductory and concluding sections the chapters take up (1) the physiology of the brain, its origin, its relations to cerebral anatomy, (2) the continuity of nature and the specificity of organs, (3) mental activity and the cerebrum, and (4) Gall's positivism, and the anatomo-physiological representation of the mental life.

Gall did give the greatest impetus to the doctrine of plurality of cerebral functions, but it is necessary to point out that the crude statements of a hundred years ago are not the same as those of twentieth century neurologists. Physiologically the brain is made up of a *plurality of mechanisms*, but it is not a *collection of organs* as Gall believed. On the other hand and contrary to Gall, it is a unitary viscus but not unitary in the sense of Flourens. Gall's cerebral plurality view was the outcome of the logical application of the doctrine of independent mental faculties and propensities, using as the fundamental basis the belief that the brain is the organ of mind.

As an account of an important historic contribution the book is interesting reading, but like many histories of scientific movements it tends to demonstrate too much. If Gall had the knowledge of cerebral anatomy and physiology we now possess he might not have put forth such crude phrenological views as have even recently been promulgated, but many important facts were not discovered in his day. His influence, especially on clinical neurology, was beneficial and great, but fortunately the older view is now passing. Blondel's book is more than an appreciation, it is a defense of Gall's views, with interpretations to make the matters fit into the advances of a century. Even phrenology in its crass form is not taboo, for the existence of an Institute and the publication of a Journal of Phrenology in New York City are noted with approval.

SHEPHERD IVORY FRANZ

GOVERNMENT HOSPITAL FOR THE INSANE

Eugenics; Twelve University Lectures. M. A. ALDRICH, &c. New York: Dodd, Mead, 1914. Pp. 342.

This volume representing the various viewpoints of physiologist, anatomist, sociologist, physician, biologist and psychologist affords a very convenient compendium of the best opinions upon eugenics. Though each of the well-known writers brings his distinctive type of training and materials to the general theme there is a remarkable agreement in the trend of the arguments and in the adherence to Dr. C. B. Davenport's program of first, investigation, then education and finally legislation. Each author feels the weight of Dr. Barker's foreword, "True eugenics is, at present, in less danger from its avowed enemies than from those who masquerade as its friends," and the treatment, consequently, is refreshingly sober and practical. The Mendelian laws are stated in almost every lecture and Galton's theories appear about as frequently. The work of Davenport and Goddard is to be found in nearly every chapter. Though this material is ingeniously handled by Wolcott, Vaughn, Howell, Jordan and Ellwood the fact remains that the material available for the best informed in eugenics is still meager, and the urgent need of the present is more *investigation.*

HENRY C. MCCOMAS

PRINCETON UNIVERSITY

Bodily Changes in Pain, Hunger, Fear, and Rage. W. B. CANNON. New York: Appleton, 1915. Pp. xiii + 311.

This book is mainly a re-presentation of work which has been carried out in recent years by Professor Cannon and others at the Harvard laboratory and which was originally reported in various journals. The results are of unusual interest and importance. The experimental work has been carefully done. The book is well organized and well written.

In a sketch of the autonomic nervous system, Cannon finds it probable that the sympathetic division is arranged for diffuse discharge and is brought into activity as a whole; the sacral and cranial divisions are arranged for particular action on separate organs and may act in parts. He also emphasizes that whenever the sympathetic and either the cranial or the sacral division innervate the same region, the two systems act in antagonistic ways.

It is observed that emotions like anger, fear and pain inhibit the peristaltic waves in the stomach and the movements in the intestines as well as the secretory processes of the stomach. Anger, fear and pain also cause increased secretion from the adrenal glands. These glands are innervated by the sympathetic system and the secreted adrenin causes effects in many ways like those due to sympathetic action.

Pain, rage and fear cause an increase in blood sugar, in which process the adrenal glands play an important part. Splanchnic stimulation of the adrenal glands tends to remove the effects of fatigue and improve the contraction of fatigued muscle. This result may be due in part to the rise in arterial pressure, which is greatly effective only when the blood pressure is at a low level; and in part to a specific action of the secreted adrenin upon the fatigued muscle, which is effective even upon a muscle deprived of its nerve supply by section and degeneration. The time required for coagulation of the blood is decreased by adrenin, and, correspondingly, we find faster coagulation with pain, fear and rage.

All the above changes in response to emotion are shown to have utility as adaptative reactions. The increased blood sugar is a source of muscular energy; the more rapid coagulation time prevents loss of blood in case of injury; fatigue effects are set aside; the adrenin probably has a dilating effect upon the bronchioles, and so gives more efficient breathing; even inhibition of the digestive system is supposed to reserve energy for use in the more immediately necessary muscular action. The accumulation of adrenin in the blood also serves to prolong this adaptive condition, and as a net result men are sometimes able to bear up under a remarkably intense and sustained expenditure of energy. Since the emotions studied all gave the same reactions, Cannon argues that the visceral responses only contribute an indefinite uniform element to an emotional complex, and the differences which distinguish emotions from one another should be sought for elsewhere. This is not inconsistent with the supposition of inborn automatic differential responses in other muscular groups. The reviewer wishes to suggest that we should, if possible, study more completely the visceral effects of joy, amusement, etc., and that a survey of the literature on circulation and breathing changes with mental conditions would add details at this point especially. It may be questioned, furthermore, whether the antagonism between the sympathetic and other systems, as outlined by Dr. Cannon, would hold as fully for these emotions, as for pain, fear and rage.

Professor Cannon shows that modern war has developed into forms that are not a natural exercise of the inborn fighting instinct, and he thinks proper exercise of this instinct can be found in international athletics.

Appetite is the desire for food arising out of the pleasures of eating, while Dr. Cannon finds hunger to be a characteristic sensation caused by contractions or cramps of the stomach.

JOHN F. SHEPARD

UNIVERSITY OF MICHIGAN

The Foundations of Normal and Abnormal Psychology. B. SIDIS. Boston: Badger, 1914. Pp. vii + 416.

In this volume Dr. Sidis outlines his fundamental concepts of psychology, concepts and principles which have proven in his hands so rich and fruitful in their application to abnormal mental life. Throughout this volume emphasis is laid on the applicability of biological concepts to the psychic process. Indeed it is pointed out that the psychic process is a biological process, and is in its main characteristics closely analogous to the life process.

Unlike the physical process, which, on account of the concept of causality, is endless and infinite and has links that can be traced endlessly in the past and the future the psychic process is finite and final; it has a beginning and an end; it begins with a purpose whether conscious or subconscious, and ends with an adjustment. This attribute of finality is precisely what characterizes the life process. Both ontogenetically and phylogenetically the life process has a definite beginning and an end, neither being linked causally to antecedents and consequents. Purpose and final causation are the attributes of the life process.

But this teleological aspect of the biological and psychic processes has its limitation. Sidis very strongly emphasizes what he calls the *chance aspects of life and mind.* This concept is of fundamental importance in his psychology and emphasizes his divergence from the Freudian psychology, which ascribes a meaning, a purpose and an adaptive value to every idea, to every fleeting thought, with the resulting highly artificial, far-fetched, often absurd interpretations of mental life.

What is true of the biological is also true of the psychological process. The general purposive activity of mental life is the resultant of the selective activity from an infinite number of spontaneous chance variations of sensations, feelings, emotions and ideas that flit through the mind. Out of an enormous mass of spontaneous, purposeless mental states, the selective activity utilizes only those which are adapted for its special purpose. These chance variations form the matrix out of which the purposive, psychic process arises.

Starting with a study of psychology, of the psychic object, and with an examination of the various hypotheses of the character of the psychic process the largest part of the volume is devoted to a presentation of various psychological theories and principles, such as that of Reserve Energy, for instance, which the author has briefly presented in former works, but which are developed in great detail in the present volume.

The "moment consciousness," a concept which Sidis first outlined briefly in his *Psychology of Suggestion*, further in his *Multiple Personality*, is fully developed in his present work. By the moment consciousness, regarded by him as the fundamental assumption of psychology, Sidis understands the synthetic unity which is the basis of all mental activity. All mental states, from the simplest to the most complex, have this in common, that they belong to a psychic individuality. Mental life is not simply a series of mental states, but it is an individuality in which the psychic series occurs.

Of special importance and significance are Sidis's studies of the various types of moments in the hierarchy of their complexity and stage of evolution, both ontogenetic and phylogenetic. These psychological studies of the various types of moments or of the various types of mental activities, arranged in their biological series from the lowest to the highest psychic functions of organic life, are the most important in the volume and constitute one of the most comprehensive and significant contributions in the domain of psycho-biology, both normal and abnormal. We may only say that Sidis classifies the infinite variations of mental activities characteristic of animal life into the following types: (1) The Desultory Moment. (2) The Synthetic Moment. (3) The Recognitive Moment.

The aspect of recurrence of moments consciousness of the lower types is at the very foundation of psychopathology and gives the underlying pathology of the clinical manifestations and of the symptomatology of psychopathic diseases. The scientific work of "The Foundations" strongly contrasts with the so-called "psychoanalysis" and with "psychoanalytic" exegesis, characteristic of the Austrian School of Freud and his disciples, a school that occupies itself with symbols, allegories, and myths.

A study of the organization and development of the moment, both ontogenetic and phylogenetic, shows the inverse relation that exists between complexity and stability. The more complex, the more highly developed is the moment, the less stable it is in its constitution and function. This lack of stability of the more complex moments, of those acquired later in the development of the individual or of the race is evidenced in the process of mental disorganization. In disease processes of the mind, the higher forms of mental organization, the moral and the social, suffer first, and when the process of degeneration has gone deeper the simpler psycho-physiological functions are affected, such as sex and food instincts. The process of mental disorganization follows from the complex to the simple, to the more lowly organized but more stable states.

The organization of moments of the psychic individuality of various types carries within itself the regulative inhibitive control. No special mechanisms are required for that purpose. Nor do we need to have recourse to Freudian repressions, suppressions, censors, and to all kinds of other mysterious agencies called in to explain with cunning ingenuity apparently inexplicable phenomena. Nor do we need to appeal to any mysterious will powers. Every psycho-biological system of groups carries within itself its own inhibitions, which are just as requisite for normal activities as are the inhibitions in the organized system of physiological activities. In pathological states, or in abnormal mental conditions, the inhibitions may either become accentuated, exaggerated, or on the other hand they may become completely removed. In case of dissociation, the dissociated moment will react with its full force and energy, because of the removal of the inhibitory control of associated sets of moments.

In states of mental dissociation the moment consciousness, because of its being cut off from the associative activity of other moments, is no longer subject to inhibitory influences and is therefore within easy reach of suitable stimuli, responding to them with the full force of stored energy until a state of fatigue and complete exhaustion ensues. On the other hand, because of the absence of associations, the avenues of approach are diminished and the dissociated moment will respond to a smaller variety of stimuli. Opportunities for the activity of the dissociated moment are diminished, but when once stimulated by an appropriate stimulus the moment responds with unchecked intensity. This gives the psycho-physiological key to the symptom-complex of psychopathic states.

In connection with the application of the physiological factors of threshold stimulations and inhibition Sidis works out a principle of great importance, a principle also developed by Professor James at the same time with Sidis but on other grounds, the principle of reserve energy.

We have seen that the evolution of mental life is from the simple to the complex. The increasing complexity of mental life, produced by the association of simple states into complex groups, brings about an inhibitory effect on the function of the components of the mental system. This inhibition, a concomitant of complexity of mental organization, is of inestimable value to the individual in his adaptations and adjustments to the environment, and plays no small rôle in the growth of civilization. The increase of the stimulus threshold of the moment, due to inhibition, produced by its association with other moments, prevents an undue exhaustion and permits the storing of energy requisite in critical moments as well as necessary to the progress of the individual and the race. Individual and social education aid in the formation and accumulation of reserve energy which makes all progress possible.

With the development of mental life there is thus an ever greater storing of energy, and the ease with which this store of reserve energy may be accessible to the individual, to the race, or to society is an index of the degree of civilization. The greater the store of reserve energy and the greater the ease with which it can be reached to tide over critical moments as well as for other purposes necessary to the individual, race, and society, the higher the state of civilization may be regarded.

Again the heightening of the stimulus threshold and consequent inhibition produced by natural selection and by education, individual and social, permits an ever greater accumulation of reserve energy, the condition of evolution and social progress.

We can well realize that the conclusions of the volume are of the utmost consequence not only from a theoretical standpoint, but also from a purely practical, medical, therapeutic standpoint, more specially from an educational and scoiological point of view.

HARRY LINENTHAL

BOSTON, MASS.

Die Grundlagen der Psychologie. T. ZIEHEN. Leipzig: Teubner, 1915. Pp. vi + 259, vi + 304.

The author's aim in the first volume is to lay an epistemological foundation of psychology which is to be independent of speculative hypotheses and derived entirely from an analysis of what is immediately given in the experience of the individual. The second volume develops the general principles of such a psychology, with occasional references to their physical and physiological determinations.

The language and terminology, especially of the first volume, are unfortunately somewhat complicated by the desire to avoid familiar words with their confusing implications and by an effort to condense the discussion through the use of many Greek and other symbols Many important details are thus only briefly treated, the reader being referred to Ziehen's earlier works.

Like all other sciences, psychology must derive its subject-matter from what is immediately *given* in experience. This general concept of the *given*, in Ziehen's terminology the *gignomena*, does not involve any kind of distinctions within experience, and especially does it not differentiate between the psychical and the material, or between "a" sensation and "my" sensation, etc. The gignomena include everything, so that it is impossible either to form a meaningful generic concept of the gignomena, or to form an idea of something absolutely different in essence from the gignomena, for example, the idea of God. These propositions constitute his principle of immanence, which he finds most closely resembling and related to Comte's positivism in its original form.

But in his epistemological "reduction" or classification of the gignomena Ziehen really occupies the Humean standpoint, since he divides them into sensational and ideational gignomena which differ from each other merely in degrees of vividness. In their concrete complexities these gignomena fail to reveal any order or scientific principles, and the latter can be established only if the changes that constantly occur in them are still further analyzed. He recognizes three kinds of changes, the physical, neural, and mental. The first two are causal, taking place in temporal sequences, along spatially more or less well definable paths, and according to the physical laws of cause and effect. The mental changes are instantaneous, non-spatial, and occur parallel with certain neural changes, but are not causally related to them and obey their own set of parallel laws. All three kinds of changes take place or are immanent in every sensational or ideational gignomenon and involve usually a long series of intermediate links. Thus, if I interpret rightly, my present ideational gignomena of a previously observed ice-block melting in the sun include not only present parallel and neural changes, but also all the physical effects of the sun-rays on the ice and the ice on the sun and all other surroundings as well as the effects of the physical events on my nervous system at that earlier moment. This view of experience is called "binomism," and Ziehen tries to distinguish it sharply from the ordinary views of interactionism and psychophysical parallelism.

On this epistemological basis psychology is differentiated from the other sciences as dealing with the parallel changes and laws in the sensational and ideational gignomena, and these changes alone are to be understood by the term psychical or mental. In this connection he criticizes in detail several other characterizations of the psychic. He objects to Brentano's distinctions between act and object as meaningless and not helpful, to Kant and his pupils' assumption of an "inner sense" as merely adding to our given sensations and ideas a fictitious act of a fictitious faculty, to the distinction between subject and object as in the last analysis substituting for this inner sense a hypothetical bearer of the sensations and ideas, and to the characterization of the psychical as non-spatial against the spatial physical offered by Bain, Dilthey, and others, as not true in the case of certain groups of sensations.

The fourth chapter discusses the general concept of the soul and is particularly interesting in view of the recent controversies about the "self." He divides the various theories about the mind or soul into two groups. The first maintains or rather hypostatizes a substantiality of the soul, while the second tries to demonstrate the specific character of the self or ego. The concept of the soul as a simple reality, dating from Plato and Aristotle, had become so much a part of the equipment of later philosophies that it was taken practically for granted even by such recent and acute thinkers as Herbart, Lotze, and Rehmke. The last is most removed from the original view, since he holds that the soul in its existence is anchored in its relation to other individual entities. A special position in this group is occupied by Kant, in whose view the soul is identical with the synthetic unity of apperception, that is, a formal or logical unity meaning not even as much as personal identity. Wundt and Lipps have only slightly modified this view. The second group of soul theories has to establish and defend the specific characteristics which are to distinguish the self from other entities. The specific ego-character is said to be experienced directly through the inner sense and to require no other proof. Ziehen answers that the only factual basis for such an experience lies in an ideational gignomenon of the self which has arisen from sensational gignomena of the body, and that it is otherwise meaningless to speak of "my" sensations and ideas, because we never have other people's experiences. The self in this sense is merely a habit of thought developed in early childhood, and it cannot even be based upon a feeling of activity, because of the ambiguity of the term "feeling." The second characteristic, that the self is the cause or bearer of all mental processes, is impossible of direct or indirect proof. The third one, the unity of the self, is logically the most plausible of all, but cannot be supported by the facts of self-observation. The constancy or unchangeableness of the self likewise has logic in its favor, since the successive stages of thinking, comparison, and reasoning seem to require a constant factor of reference. But Ziehen maintains that the approximate constancy of cortical elements during short time-intervals is sufficient. The last characteristic, the independent, non-causal origin of the soul and its rôle as a non-causal originator of all mental processes, is shown to be a groundless assumption that needs no further refutation.

According to Ziehen's own view the terms "self" or "ego" or "I" merely signify the fact that a certain given set of sensations and ideas form a collective system in which they are characterized by special interconnections, just as the drops of water in a river-bed are more closely interrelated than the individual raindrops. Nevertheless it would be considered a mere play of poetical fancy to hypostatize nowadays this closeness of relations into a river-entity, perhaps corresponding to the personified spirit of the river found in certain ancient mythologies. The same kind of reasoning is valid in the case of the mind of a group, *e. g.*, the mob-spirit.

In the next chapter the relations between mind and nervous system are discussed. The theory of the psychophysical parallelism in its modern and most widely accepted form tries to reduce to identity the two originally and essentially different series of nervous and mental processes by assuming that they are different only when viewed from two separate points of view. Ziehen accuses the supporters of this view of obscurity in thought and expression and asks, for example, who is the observer that takes two different points of view of his own experiences? How does it happen that his experiences may appear to him in two such different ways? Does the observer himself belong to the group of nervous or mental processes? Another conceptual ambiguity is dealt with in the discussion of the conscious and the subconscious, in which the latter term is allowed to refer only to those nervous changes in the gignomena which are not accompanied by mental changes.

The last chapter of the first volume is mainly concerned with the relation of psychology to logic. To psychology is attributed the twofold task of determining the actual course of thinking without regard to right or wrong reasoning and of deciding under what conditions thought processes may be judged as right or wrong. Logic, on the other hand, must establish the value of right and wrong thought and formulate rules for the correct application of these values to everyday reasoning. Analogous divisions of labor hold with regard to esthetics and ethics.

The contents of the second volume may be treated more briefly. The first chapter deals with the introspective, genetic, and experimental methods of psychology and outlines the various subdivisions of the science. The rest of the volume is devoted to the results of psychology.

The only universal characteristics of mental processes are their temporal course and their lability, while quality, intensity, and locality are peculiar to the sensations. It is difficult to understand why vividness is here omitted. After a preliminary classification of mental processes Ziehen criticizes other classifications, which again reveals his astounding familiarity with the literature and his acute logical thinking in pointing out many subtle and instructive differences. As a consequence, he seems to disagree with everybody and yet appear "not extremely radical." Stumpf's doctrine of mental functions are dealt with in detail, while the doctrine of apperception and the recent introduction of "tendencies" are brought into close connection with the theory of mental faculties.

The sensations are discussed only in so far as they are primary to the images or ideas, while the discussion of the latter and the corresponding intellectual functions and complexes occupy almost 70 pages. In addition to the simple process of retention all intellectual activities require only three other fundamental functions, analysis, synthesis, and comparison or relation. With these tools Ziehen attempts to reconstruct the theory of the association of ideas. All feelings and volitions are to him attributes of sensations and ideas, although he does not employ this term in the conventional way. One third of the volume, or about one hundred pages, are devoted to the feelings, and Stumpf and Külpe are subjected to a searching criticism based on an intimate knowledge of the experimental data in the literature. Since the feelings lack genetic independence, qualitative peculiarities, and independent occurrence, Ziehen feels justified in denying them a separate existence among mental processes. He arrives at the same conclusion with regard to all volitional experiences, after having analyzed and criticized various voluntaristic theories of the past and present.

While a casual glance over the numerous footnotes in the two volumes may give the reader the impression that the author has searched his field very thoroughly, a little analysis will reveal the fact that outside of European authorities only a scant dozen American writers are referred to in about as many cases. This, of course, need not mean unfamiliarity with their works, but it does indicate a one-sided emphasis and a neglect of a large part of the psychological literature, an error which is not confined to Ziehen alone, but which in his case is the more serious, as he attempts to deal with the fundamental problems of our science.

L. R. GEISSLER

UNIVERSITY OF GEORGIA

Sleep and Sleeplessness. H. A. BRUCE. Boston: Little, Brown, 1915. Pp. ix + 219.

This is a readable little book of six chapters, dealing with sleep, dreams, and insomnia. It forms one volume in the Mind and Health Series, of which the author is general editor. The present book is written frankly with the lay-reader in mind, but this fact does not detract from its general accuracy. In asserting, to be sure, that the dream-processes are rapid far in excess of normal waking consciousness, the author does not adduce satisfactory evidence to establish this mooted point, yet for the most part he is both entertaining and just to the facts of dream-life, so far as these facts are known. His thesis that oft-recurring dreams localizing their action in some organ of the body are likely to presage the appearance of disease in that region, is plausible; and his own dream-reports as a case in point, are a contribution to the literature of dreams. Freud's thesis of dreams as wish-fulfilments is stated and fairly evaluated.

Four types of dreams (the inspirational dream; the problem-solving dream; the dream of finding lost articles; and the prophetic dream) are enumerated, respectively illustrated, and given the scientific interpretation of subconscious motivation. Finally, the causes of insomnia, its treatment and prophylaxis, are discussed in an especially serviceable way, and its functional basis emphasized.

ELIOTT PARK FROST

UNIVERSITY OF TENNESSEE.

DISCUSSION

THE VALUE OF THE FREE ASSOCIATION METHOD IN INDIVIDUAL PSYCHOLOGY

In the March issue of the Bulletin Dr. Wells takes me somewhat to task because I found it hard to understand the endorsement given by Dr. Woodworth and himself to the free-association experiment, and more particularly to that form of it known as the Kent-Rosanoff Test. Though doubtful whether I should ask space here to discuss a difference of opinion between two investigators as to the appraisement of a certain method, I venture the following observations:

1. Woodworth and Wells remark of the work done by Kent and Rosanoff: "Within the bounds of its application, it would be an impertinence to offer as 'standard' any procedure for the free association test other than the one which these authors have developed" (*Association Tests*, p. 73). In recommending two modifications of instructions for the free-association experiment (*Manual*, p. 422) I suppose that I have laid myself open to the charge of "impertinence." In defence I contend that no mental test has yet reached that pinnacle of demonstrated merit that lifts it above any honest suggestion of improvement on the part of other investigators. The mere fact that a given test has been applied by its devisers to 1,000 subjects does not give it a sacrosanct standing in applied psychology.

2. The following excerpts from Woodworth and Wells indicate, I think, that the method proposed by Kent and Rosanoff is open to some modification and susceptible of further development:

(*a*) "If special circumstances render it desirable, it is possible to employ only a portion of the hundred words for determining the usualness of response, substituting for the remainder, words adapted to the special situation in hand" (p. 76).

(*b*) "Unfortunately, determinations of the 'median of community' . . . have as yet been made in only a limited number of subjects" (p. 76).

(*c*) "The present experimental method is placed under one disadvantage to a much greater degree than other association tests;

its material cannot be repeated within an ordinarily practical time save under greatly changed essential conditions" (p. 76).

(*d*) "In ordinary practise this [the instruction to reply with the first *word*] is not rigidly enforced, it being sometimes possible to derive elements of special significance from factors that determine the subject's departure from the set instructions" (p. 78).

(*e*) "It is most probable that the responses are also affected by the personality of the operator" (p. 79).

3. My own opinion about the free-association test has not been based entirely on the published work of various authorities. I have personally given the Kent-Rosanoff test to a fair number of children and adults (though I lack Dr. Wells's acquaintance with the insane), and I have personally gone over several score of results obtained by other investigators.

4. From this personal experience, supplemented by the reports published in the literature, I have arrived at my belief that the Kent-Rosanoff method (which I understand Woodworth and Wells to prescribe as "standard" procedure for the free-association test), is far from being "in the foremost rank among the methods of individual psychology," and far from having "established a definite standard of normality" and that for the following reasons:

(*a*) It discards the use of the time-record which many investigators have found to be a useful adjunct to any association test.

(*b*) By its instructions to "respond as quickly as you can" the Kent-Rosanoff method creates an *Aufgabe* which certainly tends in many cases to interfere with the natural expression of that individuality which it purports to reflect statistically.

(*c*) By insisting that response by a single word must be "rigidly required" it still further interferes with natural associational sequence; such an instruction, of course, operates to secure frequency tables, but it also operates to hinder the examination of individuality in mental processes. In other words, the method does not produce "free" association, but a special type of "controlled" association.

(*d*) By rejecting all introspective comment in favor of 'objective' results, the method again falls short of obtaining the best possible insight into mental machinery.

(*e*) In the actual application of these tables there arise difficulties and inconsistencies of interpretation.

(*f*) Application of the Kent-Rosanoff method does not reveal any recognizable modification in normal mentality after the age of eleven years (according to the testimony of the Rosanoffs). This means, I believe, that the method is not a very precise tool for use in individual psychology.

(*g*) Application of the method does not reveal any considerable difference in the mentality of the two sexes (conclusion of Kent and Rosanoff). This is at least at variance with common opinion and with the outcomes of many other mental tests, and suggests, again, that the method is not a very precise tool for the individual psychologist.

(*h*) Application of the method does not reveal any sure or consistent relations with general educational training. Thus, for example, Kent and Rosanoff decided that it was unsafe to risk a definite generalization as to the effect on their test of a collegiate, as compared with a common-school, education; persons with a college education show more "individuality" in their responses, but so, alas, do the insane and also children, particularly if delinquent or retarded!

(*i*) Application of the method for diagnostic purposes to individuals of markedly different status (and this is the use, of course, in which a method that "bids fair to hold indefinitely its place in the foremost rank among the methods of individual psychology" ought to shine) appears decidedly risky, since we are assured that children rated as feeble-minded or delinquent not seldom give normal associations, while normal adults sometimes give multiverbal responses, repeat the stimulus and otherwise perform quite like approved abnormal cases! In what sense, then, can we declare that the work of Kent and Rosanoff has "established a definite standard of normality"?

These observations I have stated categorically, because I cannot take the space here to quote my authorities, cite my illustrations or defend my position with argument. They will perhaps at least indicate that I did not express my divergence of opinion from Messrs. Woodworth and Wells without having given the matter some consideration.

G. M. Whipple

University of Illinois

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Claparède, E. *Psychologie de l'Enfant et Pédagogie expérimentale.* Geneve: Kundig, 1916. Pp. xii + 572.

Baldwin, J. M. *The Super-State and the Eternal Values.* Oxford: Oxford Univ. Press. Pp. 38.

Finlayson, A. W. *The Dack Family. A Study in Hereditary Lack of Emotional Control.* Lancaster, Pa.: New Era, 1916. Pp. vi + 46. 15 cents. (Eugenics Record Office Bull. No. 15).

Lahy, J. M. *Le système Taylor et la physiologie du travail professionel.* Paris: Masson, 1916. Pp. x + 198. 4 fr. 50.

Ferguson, G. O., Jr. *The Psychology of the Negro. An Experimental Study.* Pp. iii + 138. Arch. of Psychol., No. 36.

Burgess, E. W. *The Function of Socialization in Social Evolution.* Chicago: Univ. of Chicago Press, 1916. Pp. vii + 237. $1.25.

Gaskell, W. H. *The Involuntary Nervous System.* New York: Longmans, Green, 1916. Pp. ix + 178. $1.80.

Freeman, F. N. *Experimental Education. Laboratory Manual and Typical Results.* Boston: Houghton, Mifflin, 1916. Pp. ix + 220. $1.30.

NOTES AND NEWS

A BI-MONTHLY journal "devoted to the scientific study of problems related to social conduct," *The Journal of Delinquency*, is being published by the Department of Research of the Whittier State School, Whittier, Calif., under the editorship of F. C. Nelles and J. H. Williams, with a board of associate editors and collaborators.

FURTHER active interest is shown in the mental study of criminals in the establishment of a psychopathic research department to investigate criminals at Sing Sing, N. Y., under the direction of Dr. Bernard Glueck, of the Government Hospital for the Insane, and in the beginning of a psychological laboratory for the Boston Police Court, under the direction of Dr. V. V. Anderson. On the other hand, a committee of the Chicago Bar Association recently recommended that the psychopathic laboratory connected with the Municipal Court of Chicago be discontinued.

ANNOUNCEMENT is made of the death of Sir Victor Horsley, the eminent surgeon, whose contributions to the subject of cerebral functions are well known to psychologists.

THE following have been appointed fellows for the coming year in the Bureau of Salesmanship Research affiliated with the Carnegie Institute of Technology: D. L. Hoopingarner, C. P. Stone, R. L. Gould, E. S. Robinson.

PROFESSOR W. S. HUNTER, of the University of Texas, has been appointed professor of psychology in the University of Kansas.

THE following items have been taken from the press:

PROFESSOR L. M. TERMAN, of Stanford University, and Professor R. M. Gault, of Northwestern University, are giving courses in the summer school of New York University.

PROFESSOR W. F. BOOK, who has been engaged in organizing vocational education in the state of Indiana for the past three years, will return to his teaching at the University of Indiana as director of the psychological laboratory in the department of sociology.

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GENERAL REVIEWS AND SUMMARIES

TROPISMS AND INSTINCTIVE ACTIVITIES

BY HARRY BEAL TORREY

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Allen (1) finds that *Planaria dorotocephala* is both positively and negatively rheotropic, the former in the stronger, the latter in the weaker current. The reaction can often be reversed by changing the velocity of the current, the composition of the water, and the temperature.

Arey (2) concludes "that while *Amphioxus* can swim backwards for short distances, its normal orientation in continued swimming is with the anterior end in advance." "It burrows in the sand tail first."

The experiments of Bittner, Johnson and Torrey (3) lead the authors to conclude that while the earthworm (*Allolobophora* sp.) exhibits random movements, its "orientation to light is determined essentially by movements that are predictable as to direction and hence neither random movements nor 'trials.'"

According to Brun (4), who discusses the problem of orientation in general and among the ants in particular, the distance orientation of the latter is an unusually complicated psychophysical process, through which, according to the governing conditions and the organization of the species concerned, experiences of very different kinds are achieved, involving topochemical, topographic, visual and kinæsthetic impressions, often alone, frequently, however, in combination.

De Burlet (5) corroborates the results of De Kleijn and Socin (17) with anatomical evidences from serial sections of the head.

Du Porte (6) describes the death-feigning reactions in the clover weevil, *T. picirostris*, including methods of producing the feint, death-feigning attitudes, variability and duration of the response, the effect of repeated stimulation, mutilation, chloroform and ether. The death-feigning instinct often appears to be non-adaptive, if not positively injurious. The reaction is segmental and not controlled by the supra-oesophageal ganglion.

According to Essenberg (7) the water strider, *G. remiges*, is a voracious and indiscriminate feeder, preying on various insects including mosquitoes. It is positively phototactic, thigmotatic, and rheotactic, and negatively geotactic. Its sense of sight is keen; the senses of smell and hearing are much more feebly developed. Its death-feigning reaction is easily produced, much less readily after numerous stimulations.

Essenberg (8) contributes the following facts about the back-swimmers (*Notonecta*). They are very voracious. Protected by a thick layer of surrounding air they are little influenced by chemicals. They are strongly positive to light, the reaction increasing with light intensity and temperature. They fly toward bright sunlight. At zero centigrade they lose their air and become heavier than water. They are positively rheotactic. The young hatch within 20 days and resemble the adult in behavior and instincts.

Garrey and Moore (9) find that sensory stimulation acting on the earthworm tends to set up peristaltic movements, and suggest the possibility that all normal peristaltic movement may be the result of sensory stimuli, a view differing from the views of Friedländer and of Biedermann, who ascribe peristaltic waves to traction, especially to the stretching of the myodermal sheath. Stimulation of the nerve cord near the middle of the worm produces shortening of the anterior part and lengthening of the posterior part, indicating that the responses are determined not by the nature of the stimuli, but by the direction the impulses travel in the nerve cord. The relaxation of the longitudinal muscles accompanying contraction of the circular set, and vice versa, are striking examples of reciprocal innervation.

The investigation by Goebel (10) of the two orchid genera *Phalaenopsis* and *Taeniophyllum* leads him to conclude that the dorsiventrality of their aerial roots is not autonomous, but is determined by the effect of light. On the illuminated side anatomical differentiation is inhibited and the outer cells form thicker walls. The suspicion that this form of the aerial roots might be evidence for the inheritance of an "acquired character" is not supported by the facts.

Hargitt (11) corroborates Parker's observations on the Phototropism of *Vanessa antiopa*, cites evidence tending to show that this butterfly has a sense of locality, and regards as unsatisfactory the view that color pattern and wing pose have any sex significance.

According to the experiments of Harvey (12) the salt water lum nous bacteria used were killed by too great dilution of sea water with fresh water, owing chiefly to lowered osmotic pressure of solution rather than to the absence of salt. Also some salt is necessary for the continued production of light. Acids and alkalis in very weak concentrations prevent light emission, acids being more effective than alkalis, and inorganic more effective than organic acids. It is interesting that the bacteria live and phosphoresce in a pure sodium chloride solution, though of the other constituents of sea water, calcium chloride and magnesium chloride are very toxic when alone. Various alcohols exert an inhibiting action that is reversible. Saponin has no effect on these bacteria although exerting great cytolytic power on other forms in small concentration.

From his experiments on *Paramecium cordetum*, Hutchinson (13) concludes that the heat resistance of this organism is augmented when the animals coming from an alkaline culture medium are exposed to very dilute solutions of sodium chloride, calcium chloride, sodium chloride *plus* calcium chloride, potassium nitrate, sodium carbonate, or to distilled water. Coming from an acid medium, *Paramecium* is less resistant in solutions of calcium chloride and sodium chloride, but more resistant in the controls. The author finds no evidence of specific action of the salts in his experiments.

The paper by Kanda (14) is a clear and interesting general discussion of the subject of geotropism in animals with a bibliography of some 50 titles.

According to Kanda (15), *Littorina littorea* is both negatively geotropic and negatively heliotropic. Negative geotropism in sea water varies with the angle of inclination to the horizontal of the surface on which the animals move. The number of individuals responding negatively is larger, however, in the air over a moist plate. Roughness of the substratum appears to diminish the negative response. On the dry substratum the snails exhibit a degree of positive geotropism. Negative heliotropism interferes with the negative response to gravity in the direction of the sunlight. The author views the statolith theory as an explanation of the geotropism of *Littorina*.

Kanda (16) finds that *Physa gyrina*, *Planorbis trivolvis*, *Limnaea stagnalis*, and *L. columella* are negatively geotropic when their lungs are empty and positively heliotropic when their lungs are full of air. He is inclined to believe that *Physa* is naturally positively geotropic and possesses statocysts with statoliths which may be the organs of geotropic orientation. *P. gyrina* is negatively heliotropic.

According to the experiments of De Kleijn and Socin (17) the post-ganglionic sympathetic fibers for the eye proceed from the circular cervical ganglion, along the internal carotid for a short distance, then enter the middle ear which they leave as an independent nerve, entering the cranium through the superior orbital fissure along side the Bidian nerve. (See De Burlet (5).)

Krecker (18) concludes that *Hexagenia variabilis* orients positively to a breeze owing to tension exerted on the muscles of attachment. Similarly the negative position assumed with reference to gravity is attributed to the insect's means of attachment. Positive toward 16 c.p. incandescent lights, the insects took up their positions radially about such a light on a horizontal surface, facing it. On a vertical surface, the individuals above the horizontal would face away from, those below the horizontal toward the light. This variation was also attributed to factors connected with maintaining a foothold.

Lashley (19) has investigated the problem of orientation in noddy and sooty terns, by studying their nesting activities. In their recognition of the nest, both visual stimuli and motor habits are factors. The birds show no evidence 1, of any special sense of locality such as a magnetic sense functional within short flights; 2, of ability to re-trace paths by memory of successive directions and distances when these have been experienced but once. The conclusions of the author regarding the recognition of the young by parent birds are less definite. Notes on the modifiability of instinctive activities and the integration of complex habits complete the paper.

Loeb and Wasteneys (20) find not only that polyps of the animal *Eudendrium* obey the Bunsen-Roscoe law of photochemical action that Blaauw has already found to apply to the heliotropic curvature of plants, but that the "relative efficiency of the different parts of the spectrum of a carbon arc light for the production of heliotropic curvatures in the animal *Eudendrium* and in the seedlings of the plant *Avena* is practically identical."

The essential results contributed by Loeb and Wasteneys (21) are embodied in their later papers (22, 23). Loeb and Wasteneys' (22, 23), show that while "there seem to exist two types of heliotropic substances (or elements), one with a maximum of sensitiveness in the yellow-green region, and the second with a maximum of sensitiveness in the blue," these types are distributed independently of the boundaries between animals and plants. *Eudendrium* in the larvae of *Arenicola,* among animals, and *Avena*, among plants, are most sensitive to blue light, though not to the same spot of the blue, while *Daphnia* and the larvae of *Balanus* are most sensitive to the yellow-green or yellow part of the spectrum. Further, "of the two green flagellates *Euglena viridis*, and *Chlamydomonas pisiformis*, the former is most sensitive to blue, the latter to greenish-yellow." The authors think "it is quite possible, however, that plants are more generally sensitive to the blue rays of the spectrum, while among animals those may prevail who are more sensitive to yellowish-green or yellow."

Mast (24) proposes to abandon the term *tropism* on account of the variety of senses in which it has been used by various authors.

Mast (25) records some observations on the remarkable behavior of *Fundulus* in escaping from sand beach tide-pools whose outlets close with the falling of the tide. "As to the mechanics of the process," the author is "quite in the dark." He excludes vision, and light reflected from the water, as sufficient causes. The fish leave the water usually on the seaward side of the pools.

According to Mast (26), the eye-spots in *Gonium* consist of an opaque cup-shaped part and a hyaline lens-shaped part. Orientation in *Gonium* is direct, the colonies always turning in the right direction. The author holds that it is "dependent upon the time-rate of change of light energy on the photo-sensitive substance, probably the hyaline portion of the eye-spot, and not upon the absolute change or the continuous action of light."

McDermott (27) has observed that house flies have a strong positive reaction to air currents, between temperatures of 27° and 40° C.

From data obtained by measuring the reactions of the blowfly larva to light from opposed sources, Patten (28) concludes; "1. The graph expressing the values of the angular deflection of the blowfly larva from an original path of locomotion at right angles to the line connecting the sources of light, produced by a graded series of percentage differences of intensity between opposed lights cannot be regarded as conforming to the Weber-Fechner Curve. 2. Graphs expressing the values of the angular deflections produced by a graded series of absolute intensities of opposed lights having their relative intensity maintained constant, may be regarded as in conformity with the Weber-Fechner expectation. 3. The fact that two sets of data derived from the same animals, by identical experimental procedure, yield opposite conclusions so far as the Weber-Fechner Law is concerned, indicates that the agreement with the law, when it does occur, is a purely fortuitous one, and that the reactions of the blowfly larva to opposed lights are controlled by other factors. 4. It is possible to demonstrate geometrically that a photoreceptive mechanism operating after the manner of bilaterally located sensitive surfaces inclined at an angle to each other and affecting the opposite sides of the musculature in proportion to the stimulus they receive, would determine *both* types of curves which have been plotted from experimental measurements of the photic reactions of the blowfly larva."

Polimanti (29) notes the rheotropism of the tadpoles of *Bufo* and *Rana*, and suggests the possible usefulness of the reaction as a means of obtaining food.

Porcelli-Titone (30) finds that several species of bacteria, when exposed to ultraviolet light, lose the power to reproduce before the power to move. This suggests a special action of a very delicate nature upon the protoplasm of the organisms, and a further possibility that germs thus treated might be of especial value for purposes of immunization.

Rabaud (31) finds that the emission of dark fluid from the mouths of grasshoppers when captured is a reflex process following the stimulation of various localized surfaces of the body. The fluid comes from the crop. The abundance of its flow is determined in a given individual by the region stimulated. It flows most abundantly after lateral stimulation of the thorax, much less abundantly after stimulation, by pressure, of an anterior tibia. Similarly, the jumping reflex is stimulated mainly by blows on the ventral face of the abdomen that awaken no response of the mouth parts.

Rau (32) records nineteen experiments devised to test the behavior of mud-dauber wasps whose nests had been tampered with. The results differed with the individuals observed. In most cases where nests or their contents were disturbed, the owners at once detected the facts. But they often committed grave blunders, sealing empty nests, failing to lay eggs in well stocked nests, etc.

Rau and Rau (33) give an account of the nest-building activities of three species of mud-dauber wasps, accompanied by photographs of the nests, of the parasites that infest the nests of the various insects that occupy abandoned nests, and of the contents of the nests. It appears that these three species of wasps, with exceedingly similar structure and habits, differ remarkably in survivability, the least abundant species in the locality concerned thriving, strangely enough, far better than the others. In many cases, normal instincts went awry, as indicated in the previous review (32).

Shannon (34) distinguishes between the devastating marches of army worms and Rocky Mountain locusts on the one hand and true migrations on the other. In the category of true migrants he places the monarch butterfly and the dragon fly which appear both in this country and in Europe to fly northward in Spring, and southward in Autumn along routes which parallel the courses of migratory birds. Facts indicate that *Vanessa cardui* and other butterflies are also to be classed as true migrants.

The observations of Shelford and Powers (35) on the resistance of salt water fishes to contamination and decomposition products and their reactions to various physical and chemical conditions lead to a very interesting discussion of their habits, especially the migration and feeding habits of several species. It appears that herrings react to temperature differences as small as .2° C. and to hydrogen sulphide when not more than 0.5 c.c. per liter is present. Their reactions to acidity and alkalinity are exceedingly delicate. "These fish are as sensitive to acidity as litmus paper." "In connection with the entrance of salmon into freshwater. . . . it is evident that the orientation is with reference to acidity and alkalinity rather than salinity." The extreme degree of these reactions removes "the difficulty in fishes determining the direction to large rivers from hundreds of miles out at sea or finding their way into any bay, harbor, or river, or other arm of the sea which their particular physiological condition at a given time demands. It is not necessary to appeal to 'instinct' to explain the return of certain salmon to certain rivers or the running of herrings in certain localities."

Sturtevant (36) concludes from his experiments on *Drosophila* that neither sex exercises any choice in the selection of a mate. Sight is not essential in sex recognition. The olfactory and tactile senses are probably both concerned. The function of the wings in courtship is the production of sexual excitement in the female.

Swindle (37) finds that various birds and reptiles exhibit certain instinctive movements in rhythmic series and that the accustomed rhythms are modifiable. For example a cockatoo that showed a marked tendency to move its head and feet in multiples of 3 showed, after being subjected to passive movements in groups of 5, a similar tendency to react in multiples of 5.

Thompson (38) reviews certain contributions to our knowledge of heliotropism, which are published in Loeb's "The Dynamics of Living Matter," and in the papers of Loeb and Wasteneys (20, 21) which have already been considered.

After indicating the places of the selection theory and physiological analysis in the development of a science of behavior, Torrey (39) considers the relation of the Bunsen-Roscoe law of photochemical action to the phototropism of organisms and cites certain results recently obtained that extend its applicability to the behavior of the fruit-fly *Drosophila*.

According to Townsend (40), the flies *Cuterebra* and *Dermatobia*, while possessing reproductive systems presumably on the same practicable order, differ in the methods by which they are able to parasitize their hosts. *Cuterebra* has large eyes and small antennae. The essential stimuli leading to oviposition are probably visual. The eggs are deposited in large numbers in the runways of the rabbits, rats and other small rodents it infests, the maggots emerging upon close contact upon the bodies of the latter. *Dermatobia* parasitizes the larger mammals, including man, none of which live in burrows. It appears to utilize certain blood-sucking *Diptera*, including mosquitoes and deer-flies, as carriers of its eggs, capturing the carrier and gluing the eggs to the underside of the body. The maggots emerge upon coming in contact with the body of the host.

Turner (41) gives an account of various activities of the ant-lion, including methods of constructing its pit, feeding reactions, locomotion, the emergence of the imago from the chrysalis and the death-feint. Food insects and arachnids are distinguished from non-living objects by the restlessness of their movements. There is no characteristic death-feigning posture. The author agrees with James that the death feint is simply terror paralysis. Its duration, however, appears to vary around several maximal values.

Turner (42) describes picturesquely the mating of *Lasius niger* observed one September afternoon. Neither negative geotropism nor positive phototropism accounts for the behavior of the swarms that leave their nests for the nuptial dance. Mating takes place in the air, never on the ground or shrubs, where the females obtain no response from the males. A crowd of flying ants fifteen or twenty feet above the ground was composed exclusively of males with the exception of single virgin females which cork-screwed through it now and then, followed by a few males. The nuptial dance took place on a single summer day, ending at sun-down.

The female false spider *Eremobates formicaria* Koch observed by Turner (43) was nocturnal. It constructed a burrow in dry, compact soil every night, resting therein during the day. It was a voracious feeder on various insects, consuming the soft parts as well as the juices of its victims. It pounced upon, and fed upon, dead insects when they were moved. It learned to avoid hairy caterpillars. Several batches of eggs were laid, each batch in a different burrow whose mouth was closed.

Wager (44) concludes that in *Eranthus*, *Tropaeolum*, and *Geranium*, the blade of the leaf is not, but that the stem, especially the apical centimeter of it, is heliotropically sensitive; "that the perception of light is located, probably, mainly in the cortex, but that the transmission of the stimulus may be conducted both longitudinally and transversally through any of the parenchymatous cells of the stalk." Whether the direction of the light rays or the difference of intensity of illumination on the two sides is the controlling factor in producing the heliotropic curvature is not determined. That it cannot be the former merely is indicated by the difference of the behavior of the leaf stem in blue rays, to which they react strongly, and red rays, to which they react weakly if at all.

Watson (45) gives an account of the experiments of himself and Lashley which are reviewed below. He also refers to his studies on the spectral sensitivity of birds, in which he shows that the spectral range of the pigeon almost exactly coincides with that of man, a result that eliminates Duchatel's view that the homing birds uses the infra-luminous rays.

Although Watson and Lashley (46) reach no explanation of homing, their experiments appear to dispose of various current theories of homing based on vision, cutaneous sensibility, magnetic sensibility, and the functioning of the semicircular canals. After recording various facts about the homing of pigeons, frigate birds, and other—especially domestic—vertebrates, they give an account of the Tortugas noddy and sooty terns, their colonial life, migration, feeding and nesting activities, swimming and resting on the water, and retention of nesting habits. Previous experiments on homing at Tortugas are recapitulated and the experimental work on homing in 1910 and 1913 described, including flights from Key West, New York, Mobile, Galveston and points *en route* to the latter place. The authors conclude "that where proper conditions are maintained the noddy and sooty can home from almost any distance up to at least, 1,000 miles. Furthermore, the territory over which they take their flight apparently may be barren of any visual objects to which they previously may have established habits." The paper closes with suggestions for further investigation along what appear to be promising lines.

Wells (47) finds that fresh water fishes react to single salts in solution, or to combinations of antagonistic salts, in a way that tends to bring them into a region of optimum stimulation. The phenomena of antagonism are thus indicated by the behavior as well as the resistance of organisms. The fishes are less sensitive to salts than to hydrogen and hydroxyl ions. Starvation and overfeeding and acclimatization modify their reactions. The relation of the migrations of anacdromous fishes to rhythmic changes in their metabolism is discussed.

Wells (48) recounts experiments showing the importance of alkalinity and acidity in the reactions of fishes. He also cites numerous previous investigations in support of the conclusion he draws from his own work that, contrary to the usual view, a small concentration of hydrogen ions is beneficial rather than deleterious to organisms, and that the toxicity of distilled water may be due in large part to its neutrality.

Wheeler (49) describes some of the habits of *M. sanguinea* and quotes an account of a nuptial flight involving thousands upon thousands of individuals. He finds that *Myrmica*, the most primitive of existing ants, founds its colonies in precisely the same manner as the most highly specialized species.

Yerkes (50) records the behavior of a monkey toward her stillborn offspring. During a period of four weeks, until the corpse was reduced, through handling, decomposition and licking, to what looked more like a bit of rat skin than the remains of a monkey, the mother watched over it so assiduously that it was impossible to take it from her except by force.

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SENSORY PHYSIOLOGY OF ANIMALS

BY K. S. LASHLEY

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The direction of interest in the study of sensory physiology seems to have changed little during the past year. Studies of photic reactions still predominate, but a somewhat greater interest in the chemistry of light reception is manifest. A number of papers on the sensitivity of lower organisms to chemicals have appeared, but these seem, for the most part, to be preliminary studies without analysis of the receptors involved. The most thorough studies in their respective fields and the ones which should arouse the greatest interest are those of Buddenbrock (6) and Mast (28).

Sensory Reinforcement.—Cary (8) finds a reduced rate of metabolism (measured by the CO_2 produced) and of regeneration in the medusa, *Cassiopea*, after removal of the marginal sense organs. His experiments show that this is not merely the result of the diminished muscular activity following the removal of the organs. Horrax (16) sectioned the tracts of Flechsig and of Gowers in the dog and traced the degeneration of the cord and cerebellum. The ventral spino-cerebellar bundle was restricted to the cephalic half of the cerebellum; the dorsal to the caudal half of the vermis and the medial portions of the lateral hemispheres. No disturbances of behavior except those referable to the loss of muscle sense and tonus were found and almost complete recovery followed.

After treatment of a restricted area of the motor cortex with strychnine, Amantea (1) found, before the onset of diffuse excitability, a period during which clonus of the muscles supplied by the area could be excited only by stimulation of a restricted group of cutaneous receptors. When the area for extension of the toes, determined by faradization, is strychninized this reflex is elicitable only by stimulation of the dorsal surface of the same foot. Similarly, for contraction of the toes the plantar surface of the foot must be stimulated.

Tactile and Organic Receptors.—Barrows (5) describes the accurate orientation of the orb-weaving spider to localized vibrations of its web. Amputation of each pair of legs singly did not disturb the reaction. The behavior is described as a "positive vibrotaxis" (a reaction to unequal stimulation of symmetrical parts) but this is not borne out by the experiments. Krecker (21) notes the positions assumed by *Ephemeridæ* with respect to the source of light and to gravity and the compromise in the reaction to these stimuli in combination. Crozier (10) and Sayle (34), give data on tactile excitability in connection with their general studies on cutaneous sensitivity reviewed below.

Sensitivity to Chemicals.—Crozier (11) denies Coghill's view that sensitivity to high concentrations of chemicals applied to moist peripheral surfaces is due to stimulation of tactile and pain receptors through the destruction of the germinative layers of the skin. Evidence is given to show that in the frog there is no correlation between the penetration of the skin by the chemical and the exciting effect of the solution. Cocainizing destroyed sensitivity to pinching but not to formic acid. The receptors for the common chemical sense are distinct from those for tactile stimulation. From experiments on *Ptychodera* the same author believes that this organism has generalized receptors open to stimulation by both chemical and mechanical means since these elements could not be isolated by fatigue (Crozier, 9). In an extensive study (10) he finds sensitivity of Holothurians to light, contact, and chemicals but not to heat. A negative crawling reaction is given to light and a quick contraction of the tentacles and other organs to sudden shading. Avoiding reactions are given to acids, bases, salts, alkaloids, to maltose among carbohydrates, and to volatile oils. The chemical sensitivity resembles that of the earthworm. In a study of the pithed frog (12) Crozier finds antagonism in the exciting effects of the salts of sodium, calcium, and potassium.

Moore and Kellogg (30) describe the movements of the earthworm in a constant electric current.

Studies of the olfactory sense of insects have been extended by McIndoo (29) to fifty species of beetles, eleven of which were tested experimentally for the location of the olfactory organs. The experiments limit the olfactory function to the pores (organs of Hicks) on the elytra, wings, legs, and mouth-parts of the beetles.

Shelford and Powers (35) find that herring, in the gradient tank, show a sensitivity to 0.6 degrees C. (possibly to 0.2 degrees C.) and react negatively to an 0.045 per cent. solution of hydrogen sulfide. Acute sensitivity to the oxygen, salt, and acid content of the water appears in these and other marine fishes. The importance of such sensitivity in determining the migrations of fishes is emphasized. Seven species of fresh-water fish were tested by Wells (38) for sensitivity to dissolved chlorides, nitrates, sulphates, and combinations of these. With antagonistic salts the fishes choose the optimum part of the gradient tank.

Howat (17) found that cutaneous sensitivity of the frog to chemicals is reduced by injections of nicotine. The duration of paralysis of the cutaneous receptors and the time required for recovery varies for different areas of the skin. Reflexes to deep-lying receptors are not affected by the drug. Sayle (34) reports experiments on the cutaneous sensitivity of the mud-puppy to tactile, chemical, thermal, and photic stimuli, to all of which the amphibian reacts with an intensity varying with the region stimulated. Excitability to acids is proportional to the degree of ionization. Animals fatigued by HCl showed reduced tactual excitability while sensitivity to other chemicals remained. If by this the author means other acids the point is of considerable importance and is made without adequate evidence.

Burr (7) found that *Amblystoma* larvae from which the nasal placoids had been removed snapped more frequently at moving sand-grains than did normals and failed to find motionless food which was found by eyeless animals with the nasal sac uninjured. Stunted growth of the forebrain resulted from removal of the nasal sacs.

Static and Auditory Receptors.—Buddenbrock (6) has made an extensive analysis of the structure and function of the statocysts of *Pecten.* The right statocyst is less differentiated than the left and its removal produces no disturbance in the mollusc's behavior. *Pecten* orients to gravity by rotation around any one of its three axes. Rotation around the hinge combines a reflex from the viscera and one from the left statocyst. Rotation around the long axis and around the long and vertical axes combined, as in free swimming, is conditioned wholly by the presence of the left statocyst. Kanda (19) describes the reactions of *Physa gyrina* to gravity but gives no evidence for the receptors involved in orientation.

Reisinger (33) extirpated the midbrain and cerebellum of the perch. With the destruction of the midbrain the balancing reflexes are completely lost. Loss of the cerebellum is followed by reduction of the force and coördination of single movements while attempts at balancing still recur.

Reed (32) traces the development of the fenestral plate of *Necturus* and discusses the phylogenetic bearing of its origin. Goodrich (15) makes a comparative study of the development of the middle ear with reference to the fate of the embryonic gill-elements.

Localization of sound by the albino rat has been studied by Barber (4). The rats were confined in an hexagonal pen, insulated from visual, olfactory, and tactile stimuli. Auditory stimuli could be directed from any point on the circumference of the pen and the rats were trained to go to the side of the pen nearest the source of sound. The average error of localization of clangs after training was 2 to 4 inches on the circumference of the box (20 to 40 degrees). No reactions were obtained to pure tones. Hunter (18) has continued his studies of the auditory sensitivity of the rat, confirming his earlier work. The animals could not be trained to react to tones from single forks or to combinations of such forks. They reacted to the Galton whistle but did not distinguish it from the accompanying noises and did not react to it when these were eliminated.

Sensitivity to Light.—The polemic articles of Loeb and Wasteneys (23, 24, 25) justify a plea for fairness in criticism, particularly as the authors employ the same logical method which they condemn in Hess. They determined the relative stimulating effects of different parts of the "carbon-arc spectrum" for various micro-organisms and conclude that there is no sharp distinction between the photosensitivity of plants and animals. The energy of their lights, selected "with the aid of prisms and mirrors" was absolutely uncontrolled so that their results are neither reproducible nor comparable with those of other workers. Hess at least distinguishes between wave-lengths, energy, and stimulating effect. These authors seem to have forgotten that wave-length and energy are not synonymous.

In a preliminary report Mast (26) describes apparatus for determining the relative effect of monochromatic lights for micro-organisms. Energy measurements were made but the results given for various protista are not corrected for these. As is to be expected from the different spectrometer systems there is no agreement between the results obtained by Mast and by Loeb and Wasteneys for the same organisms.

Arey (2, 3) gives an outline of the development of theories of retinal function. Movements of retinal pigment are established for amphibia and birds, less certainly for mammals. Changes in the form of the cone myoid under light have been observed in all vertebrates. The activities of the rod myoids vary with different classes. No uniformity of retinal movements exists throughout the vertebrate classes. Detwiler (13) finds in three species of tortoise and a lizard only cones in the retina. Light induces migration of pigment, contraction of the cones, and other changes.

Kranichfeld (20) observed that bees restrict their visits, in any one locality, to flowers reflecting long, or to those reflecting short wave-lengths and urges this fact in support of von Frisch's view of dichromatic vision in insects. Spurgeon (36) describes the eyes of three species of blind cave-dwelling crayfish.

Mast (27, 28) contributes the most important study of vision in fishes that has yet appeared. Flounders assume a color closely similar to that of the background on which they lie and show characteristic differences for each wave-length as well as for different shades and patterns of gray. The stimulus to adaptation is received through the eyes and depends to some extent upon the relative illumination of the substratum and the light coming from above. The fusion rate on the retina is practically equal to that of man. Discrimination between dots of 2 and 3 mm. was found. Some evidence for the selection of substratum upon the basis of wave-length, intensity, and pattern is presented.

The experiments of Fletcher, Cowan, and Arlitt (14) upon chicks hatched from alcoholized eggs suggest a slight visual defect as the only result of injury to the eggs but this point is not considered by the authors.

Using the Helmholtz purified spectrum, Watson (37) determined the limits of the visible spectrum for the chick to lie at about $\lambda = 3{,}950$ and $\lambda = 7{,}150$; for the homing pigeon at about $\lambda = 4{,}200$ and $\lambda = 7{,}120$. The curve of threshold stimulating effect of the spectral lights for the fowl is similar to that of man, with its apex at $\lambda = 5{,}200$. The bearing of the spectral limits found upon theories of homing is discussed. Lashley (22) tested the relative stimulating effects of monochromatic lights for the light and dark adapted fowl, using the Yerkes-Watson apparatus, and obtained some evidence for the Purkinje phenomenon. Differential reactions to wave-lengths were established between $\lambda = 6{,}500$ and $\lambda = 5{,}200$ and between $\lambda = 5{,}880$ and $\lambda = 5{,}000$, and these persisted in spite of extensive changes in the relative energies of the lights. Yerkes (39) summarizes the study of color-vision in the ring dove which was reviewed here last year.

Patten (31) has made an instrument for directing a small beam of light which should prove useful in the study of the localization of photo-sensitive areas in invertebrates.

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HABIT-FORMATION AND HIGHER CAPACITIES IN ANIMALS

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The most important experimental work of the year includes studies of habit-formation as affected by strength of the incentive, age, distribution of effort, drugs, and sensory factors; studies of the limits of learning-ability of animals required to respond to a stimulus after a period of delay; and studies of situations in which the constant factor is relational.

Dodson (5) presented 18 cats with the problem of choosing the more strongly illuminated compartment of a Yerkes experiment-box. The order of presentation was irregular. The incentive to correct choice was the avoidance of punishment. The animals were divided into three groups according to the strength of the current through the primary coil of an inductorium, which served as the source of punishment. For a fairly difficult problem, a shock of medium intensity proved optimal; for a less difficult problem the kittens receiving the strongest shock required in the average 55 trials as against 60 trials for those receiving the medium shock; and for an easy problem, those receiving the strongest shock required 35 trials, those receiving the medium shock, 50 trials, and those receiving the weakest shock, 75 trials, for perfecting the habit.

Fletcher, Cowan and Arlitt (7) studied inherited and acquired reactions of normal chicks as compared with chicks hatched from eggs treated with distilled water and with alcohol, and with eggs which had been perforated and sealed. Alcohol *per se* has no specific effect other than that attributable to malnutrition during incubation, and produced as readily by other agents. Chicks hatched from eggs which had been tampered with differed from normal chicks in showing less caution in jumping from heights, and in slower acquisition of the maze-habit and discriminative associations. The reactions of pecking and drinking and the processes of inhibition are alike in normal and abnormal chicks. Imitation is not a factor in the growth of the pecking reaction; and the authors differ from those students who have found chicks to be positively phototropic.

Hubbert (8) trained five groups of rats on a maze-problem. The ages of the groups at the beginning of training were 25, 65, 200, 300 and 500 days, representing the stages of youth, sexual maturity, maturity, senescence and senility. Records were taken in terms of time and distance, errors being disregarded. The effort required for perfection of the habit, as well as the time required for the execution of a perfect run, vary directly with age. Sex-differences are negligible, except that the males of middle age learn more quickly than the females. The time of execution of a perfect run after the habit has been perfected is less for females than for males. No advantage was gained by working at night rather than in the daytime. Continued practice after perfection of the habit did not result in shortening of the time. Rapidity of learning may be predicted from the family-group. The most rapid stage of improvement occurs earlier in the learning-process of the younger animals than of the older ones.

Myers (15) fed a pig several times daily in one of two compartments, *A* and *B*, requiring the animal to learn the pathway to *A* first. The errors comprised 33 per cent. of the total responses to *A* and 5 per cent. of the total responses to *B*. The results exhibit the persistency of the first of a series of habits, and the fact is presented as significant.

Ulrich (21) trained white rats in the Watson circular maze and in the opening of two puzzle-boxes. The animals opened one box by lifting a latch with the nose, and the other by depressing an inclined plane at the side of the box. A minimal time and the elimination of observable useless movements constituted the criterion of a perfected habit. The questions studied were whether the giving of a large or a small number of trials a day makes for more efficient learning of a single problem; whether the optimal method of learning a single problem also holds in the learning of two or more problems concurrently; and whether two or more problems are learned more economically when attacked successively or concurrently. When two problems were learned successively, the rats given one trial a day required the smallest number of trials for the perfection of the habit; and the group given three trials a day required fewer trials than the group given five trials a day. A small group given one trial every third day promised better results than any of the regular groups. When three problems were attacked concurrently, the proficiency of the rats given one, three and five trials daily stood in the order named. A much larger total number of trials was required by the groups learning the three problems concurrently than by the groups learning them successively. For the learning of the problems in the fewest number of days, five or more daily trials were necessary. Differences in retentiveness were unimportant.

Vincent (22) continued her work on sensory control of the behavior of the white rat in the maze, and found that in relative effectiveness of the different sensory clues on accuracy, the olfactory maze leads; the maze without walls stands next; and the black-white and the ordinary mazes are of about equal value. A comparison of the total errors made in the first three alleys with those made in the last three show that the final members of the series were mastered first. The comparison holds for individuals as well as for groups.

Walton (24) tested the influence of distracting stimuli on the delayed reaction of the dog to light. The home-box was sometimes rotated so that the animal did not face the food-compartments during the period of delay; and the dog's attention was also directed to a bit of meat or to the activities of the experimenter during the delay-period. The author found that discrimination of four compartments was retained during a one-minute period of delay, and discrimination of fewer compartments for a longer time; that visual, olfactory and auditory distractions could be overcome; and that visual and olfactory secondary cues could be eliminated without causing permanent disturbance of training.

Cole (4) contends that Hunter's work on the delayed reaction in raccoons, if consistently interpreted, would tend to confirm the results which Cole drew from his own work: namely, that the animals possessed a mechanism which functioned as visual representation; and that there is no evidence which justifies the assertion that such representation is "imageless" in type. Cole also emphasizes that the procedure of Gregg and McPheeters, who attempted "to demonstrate the inadequacy of Cole's experiment," was not analogous to Cole's procedure; since they deliberately attempted to train the animals to respond to constant factors which Cole had tried to keep variable and ineffective. Cole's paper is somewhat polemic, having been influenced by the phraseology in which the Chicago authors presented a part of their critical discussion of Cole's work. Hunter (9) replies that the ideational function ascribed to the raccoons and to one child was strictly sensory in content and could not be visual; that the content need not copy the original stimulus in order to represent it; and that in this case it was probably kinæsthetic. If Hunter could accept as a substitute the physiological correlate of kinæsthesia—*i. e.*, a muscular response not grossly observable—his interpretation and Cole's might readily be reconciled. Such muscular activity is held by some to be an essential condition of visual imagery, and indeed the only functional factor. Whether the raccoons should be accredited with imaginal content in the circumstances would then seem to depend on the metaphysical presuppositions adopted.

The Elberfeld horses received their share of attention during the year. Schröder (18) and Schneider (17) continue a discussion started in 1913 as to whether the horses' alleged mathematical ability is innate or acquired. Müller (15) communicates a private letter from F. Faustinus, who in 1913 investigated these claims, with special interest in the possibility of sleight-of-hand trickery. He discovered that it was actually being used by the stable-keeper—an individual of no mean ability. The latter had mastered a system of rapid evolution of the second, third and fifth powers of integral numbers, and kept at hand a table of the evolution of fourth powers. When the horse was presented with a mathematical problem, it would begin tapping, and continue until the keeper signalled it to stop. Faustinus found that *Muhamed* reacted to slight head-movements given by the keeper and visually perceived. The keeper could hold the horse's attention from a considerable distance outside the stable. When this communication was prevented the horse tapped at random. Faustinus learned the system of signals and thereafter could work alone and obtain any answers which he desired. *Hänschen* and *Berto*, the two other horses, were also dependent on the keeper's proximity and knowledge of the answers, but Faustinus was unable to ascertain the nature of the signals, further than that they were not visually perceived. He found the keeper extremely tricky, however; and never got correct answers from the horses except when the keeper was within hearing. Krall requested Faustinus to cease his investigation when the latter informed him of the general trend of the results, Krall maintaining that they no longer served any purpose in which he was interested. Faustinus insists, however, that Krall's honesty is unimpeachable, and that the latter is simply the victim of a hoax perpetrated by the keeper. He also emphasizes the extremely bewildering character of the setting, and declares that he would certainly have accepted

Krall's explanation of the behavior of *Hänschen* and *Berto* had he not previously discovered the fraud in the case of *Muhamed*, and thus been led to watch the keeper more closely.

Moekel's (14) article is not accessible to the reviewers, who depended on Meumann (13) for a summary of its contents. *Rolf*—an Ayredale belonging to Frau Moekel—is described as having exhibited an ability exceeding that claimed for Krall's horses. His superiority consisted in the greater spontaneity of his activities. It is said that he developed, without training, a system of communication by tapping; that he showed an early fascination for excercises in mental arithmetic; learned to decipher his mistress' typewriting; assisted her in devising an alphabetical form in which the position of each letter could be indicated by tapping; insisted on spelling phonetically; learned to distinguish Sunday from other days in the calendar by its being printed in red; signalled inquiries when in doubt; and exhibited an adherence to definite ethical principles. Meumann was disposed to accept the report in good faith, and to treat it as epoch-making. The present reviewers confess to a strong skepticism. The experiences of Moll and Pfungst with *kluge Hans* and of Faustinus with Krall's horses indicate that even eminent scientists may be hoodwinked into too hasty a dismissal of the possibility of "unconscious" assistance or of fraud. The present case has many earmarks of those which have been exposed.

Yerkes (25) criticises the present methods of recording observations, and urges that automatic recording devices be developed so as to nullify the "observational imperfections of the experimenter."

Yerkes (27) also describes his recent work on the behavior of monkeys and an ape in the multiple-choice situation. The animals were severally fed in nine food-boxes in irregular order. At each trial a group of contiguous boxes, varying in number from two to nine, were open. The box to be chosen was indicated by its position in the presented group, regardless of the place of the group in the series of nine. The boxes to be selected were in problems (1) the first on the left; (2), the second from the right end; (3) alternately the first at the left and the first at the right; and (4) the one in the middle, of the presented group. The animal was fed in the box to be selected, and punished for entering a different box by being confined for a definite time in the latter. The same order of presentation was given in each series of ten trials. After each problem had been learned, a different order was given, the problem remaining the same. This control-test showed whether the animal had simply memorized the original order of presentation, or had chosen the correct box according to its position in the presented group. In the latter case it was assumed that the effective factor had been relational, and that the animal's behavior was analogous to ideational behavior in man. The degree to which the animal adhered to a typical trial-and-error method of eliminating wrong responses, or resorted to more complex methods, was taken as an index of the relative importance of "ideational" methods in the learning-process.

Three out of eleven animals were satisfactory subjects: one *M. rhesus*, a *M. cynomolgos*, and an orang-utang—all males. When the work had to be dropped, the first animal had solved the first three problems and was well along with problem 4; the second had solved the first two; and the last animal only the first one. The monkeys were more disposed to a trial-and-error mode of selection than the orang, and therefore made much more rapid advancement in learning. The author therefore concludes that the number of trials required for mastery of a problem is not a safe criterion of "intelligence." He regards the learning record of the *cynomolgos* as indicating a lower order of intelligence than that of the *rhesus*, and points out a striking dissimilarity between the types of curves yielded by the monkeys and by the ape. He regards the orang as having indicated an "insight" into the problem, in that the latter was suddenly and finally solved at the end of 290 trials during which a maximal percentage of errors had occurred without any indication of improvement.

Yerkes believes that his monkeys yielded relatively abundant evidences of ideation, but scanty evidence of what Thorndike calls "free ideas" or what Hobhouse calls "articulate ideas." As evidence of ideation in the ape he urges (1) the use of several different methods; (2) the sudden transition from method to method; and (3) the final and perfect solution of problem 1 without previous diminution of initial errors, etc. The critic who is disposed to insist on a different interpretation of the experimental data need not quarrel with the author. He presents in detail the data from which the conclusions are derived, so that the facts are readily separable from their interpretation.

Burtt (2) presented the first multiple choice problem of Yerkes to three adult white rats, one of which was inbred. They solved it in 200 trials or less; and a younger inbred rat solved it in 350 trials. He presented two rats with the second problem, but neither solved it in the 800 to 900 trials given them.

The observations reported by Shepherd (19), Eaton (6) and Maud (12) were casual. Their accounts abound in "anthropopsychisms."

Smith (20) summarizes the results obtained by a number of earlier experimenters in learning capacities, and treats them under the point of view that mental phenomena are observable and traceable in evolutionary process. Thomson (21) gives a naturalistic presentation of some of the same facts in illustration of the theme indicated by the title of his book. The work should have great stimulating value for beginners, although many impressions which it designs to make will hardly survive critical treatment.

Bose (1) used a "resonant recorder," the needle of which vibrates instead of making continuous contact with the recording surface, to obtain graphic records of the movements of certain plants in response to electrical stimuli. He noted a group of responses which strikingly resemble those made by animal tissue under similar conditions. This group includes a latent period, a daily rhythm of response, with decrease of irritability during the early morning hours, a decrease of magnitude of response after administration of chloroform, arrest of pulsations under ether, suffocation by CO_2, response to summation of stimuli, and unsteadying effects of alcohol. Kaempfert (9) discusses the work of Bose at length, and regards it as proving that plants have a nervous system. He also notes that plants have a death spasm, which always occurs at the same temperature.

Lillie (10) argues that behavior to be regarded as purposive need not be distinctive of living organisms alone. He defines adaptation as a species-conserving characteristic, which includes protective resemblance, radial and bilateral symmetry, antero-posterior and dorso-ventral differentiation, food-taking reactions, hibernation and reproductive activity.

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SPECIAL REVIEWS

The Mechanism of Mendelian Heredity. T. H. MORGAN, A. H. STURTEVANT, H. J. MULLER, C. B. BRIDGES. New York: Holt, 1915. Pp. xiii+262.

The book under review has been accorded wide recognition by students of Genetics in this country. The central theme running throughout the text is the correlation of the phenomena of Mendelian heredity with the chromosomal mechanism of germ cells. To the support of their contentions, the authors have succeeded admirably in marshalling the facts which have been brought to light in their extensive studies on the little fruit fly *Drosophila*. Almost every important point in Mendelian heredity has been illuminated both cytologically and genetically by results obtained in the laboratories of the University with which the authors are connected. The book therefore largely represents the results and conclusions of this school of biologists. One of the many excellent features to be found in the general make up of the book is the matter of illustration. Most of the figures and diagrams are new, with the result that the text is free from shopworn illustrations.

Every one of the nine chapters is worthy of careful reading and study, but those deserving especial mention are Chapters III, IV, VI, VII, and VIII, dealing respectively with Linkage, Sex Inheritance, Correspondence between the Distribution of Chromosomes and of Genetic Factors, Multiple Allelomorphs, and Multiple Factors.

The central idea of Mendelian heredity is segregation, and according to the factorial hypothesis the term "factor" is "used for something which segregates in the germ cells, and which is somehow connected with particular effects on the organism that contains it." The factors are supposed to have their "loci" in the chromosomes. Since in any given form the number of specific characters is in excess of the number of chromosomes, it follows that each chromosome must carry more than a single factor. Experiments have shown that in several different species, and in *Drosophila* especially, groups of two or more characters often tend to stay together in successive generations of a cross. This tendency of factors to stay together is called *linkage.* The linkage theory finds its strongest support in the fact that linked characters follow the same law of distribution as the chromosomes in gametogenesis and fertilization. This is especially clear in the case of sex-linked characters, which follow exactly the same distribution as the sex-chromosomes.

The study of linkage has brought to light another phenomenon known as *crossing over.* "If two factors lie in the same member of a chromosome pair we should expect them always to be found together in successive generations of a cross unless an interchange can take place between such a chromosome and the homologous chromosome derived from the other parent." Evidence has been found which indicates that pieces of homologous chromosomes do sometimes interchange segments, and this process of interchange is called crossing over. An opportunity for such an interchange to occur is offered during the course of germ-cell formation, at a critical stage in which homologous chromosomes are temporarily united in pairs. During this period the members of a pair often twist about each other, and later in coming apart an interchange of pieces might readily occur. One of the interesting points about crossing over is the fact that it never occurs in the male. In the female the amount of crossing over is ordinarily constant for any given combination, but is different for different combinations.

Another interesting point about crossing over is that it offers an opportunity to determine the loci of factors in the chromosome. "The chance that such a process of crossing over will occur between any two given points on the chromosome should obviously be greater, the greater the distance between those points. If then the Mendelian factors lie along the chromosomes, the amount of crossing over between any two of them will depend on their distance apart. Should two points lie near together a crossover will only rarely occur between them; if they lie further apart the chance of such a crossover taking place at some point between them will be greater. From this point of view the percentage of crossing over is an expression of the 'distance' of the factors from each other." By determining the percentage of crossing over in various combinations, the authors have been able to plot the loci of the various factors in each of the four chromosomes which characterize the cells of *Drosophila.* They are thus able to show the linear arrangement of factors in the chromosomes, which is one of the newest developments in Mendelism.

Finally, we may mention another line of evidence which strongly supports the chromosome interpretation of heredity. We refer to non-dijunction, in which the abnormal behavior of the sex chromosomes in the maturation of the egg can be correlated with an identical abnormal distribution of all sex linked factors.

The points here cited are only a few of the many to be found in this book, but they will serve to illustrate the more important phases of Mendelian heredity which are now receiving the attention of geneticists. The student of Comparative Psychology must necessarily be interested in these problems, for sooner or later he will have to deal with them.

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The Investigation of Mind in Animals. E. M. Smith. Cambridge: Cambridge University Press, 1915. Pp. ix+194.

This volume was written to present "a brief account of the modes of procedure employed by Animal Psychology, its aims, trend and the general nature of the results hitherto obtained."

The first chapter on protozoan behavior is concerned mostly with the reactions of paramecia. The tropistic and the trial and error interpretations are contrasted. Reversal of reaction by change in the physiological condition or by a mere variation in the intensity of the stimulus counts in favor of the trial and error theory, which alone admits of "plasticity."

Retentiveness, habit formation, associative memory and sensory discrimination are reviewed in the second and third chapters. Some of the familiar studies on learning the maze, and auditory and visual discrimination are outlined, and a reference is made to the work of Pawlow.

In chapter four the author emphasizes that in an instinct we have an impulse and the satisfaction of the impulse. The impulse constitutes the instinct, and, in the absence of a proper stimulus, it may seek satisfaction until a suitable object is encountered An instinct is neither a simple reflex nor a mere chain of reflexes. The effects of practice and of structural maturity are considered.

The chapter on *Homing* treats mainly of the travels of ants, bees, and pigeons. After a review of several studies of *Imitation*, the conclusion is reached that "no case has, as yet, been recorded which cannot, in the last resort, be adequately analyzed on the 'stimulus and response' basis, the object or situation, either in itself or through association, suggesting the appropriate reaction." The range of attention may be narrowed to the vital part of the apparatus. Neither learning from "putting through" nor imitative behavior can be a criterion of intelligence. With the possible exception of the method of delayed reactions, no test as yet applied demonstrates "that animal learning is anything more than a process of association, on the perceptuo-motor level. The one point that clearly emerges is the need for new methods of inquiry."

The book as a whole is a rather brief survey of the topics indicated with little that is original in its treatment. It should be added that this is just what it pretends to be. It would probably be of use in a short course, and the general reader will doubtless find it worth while.

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The Study of Human Behavior. R. M. Yerkes. *Science*, 1914, **39**, 625–633. *A Study of the Crow* Corvus Americanus *Aud. by the Multiple Choice Method.* C. A. Coburn & R. M. Yerkes. *J. of Animal Behav.*, 1915, **5**, 75–114. *A Study of the Behavior of the Pig* Sus Scrofa *by the Multiple Choice Method.* R. M. Yerkes & C. A. Coburn. *J. of Animal Behav.*, 1915, **5**, 185–225. *The Ideational Method of Studying the Behavior of Man and Other Animals.* R. M. Yerkes. *Psychol. Bull.*, 1915, **12**, 330–331. *Methods of Studying Ideational Behavior in Man and Other Animals.* R. M. Yerkes. *Psychol. Bull.*, 1916, **13**, 93–94. *The Mental Life of Monkeys and Apes: A Study of Ideational Behavior.* R. M. Yerkes. *Behav. Mon.*, 1916, **3**, no. 1, Pp. iv+145.

The above list includes all references to date on the Multiple Choice method of studying behavior. Inasmuch as this material lays down the essentials of purpose, method and interpretation as conceived by the authors, a comprehensive review and criticism cannot be amiss.

The Multiple Choice method presents the subject tested several series of simultaneous visual stimuli from which he is to select one stimulus. Success is rewarded and failure is punished. The experimenter so arranges the presentation of stimulus series from trial to trial that the stimulus to be selected bears (for the experimenter) a certain constant relationship to the whole. Thus, to be concrete, in the work here reviewed, 2 pigs, 2 crows and 3 primates were tested with an apparatus which made possible the simultaneous presentation of nine stimulus boxes. The number actually presented to the animal at any one trial might vary from two to nine; but the boxes that were presented, *i. e.*, whose front doors were opened, were always contiguous boxes. Each box contained food, but any particular bit of food was only accessible to the animal after he had entered the proper box. This box might be: (1) the one at the left end of the row of open boxes, (2) the one at the right end, (3) alternately the one at the left end and the one at the right end, (4) the middle box, (5) the second one from the left, or (6) the second one from the right, etc., as the experimenter determined. Whichever relationship was decided upon remained constant until the animal reacted correctly 10 times in succession or until such success was despaired of by the observer. There is no reason to suppose that the animals derived cues from the experimenter, his method of operating the boxes or from the food. Control series were introduced in some cases to determine whether the subjects were responding to particular settings or whether they had developed the capacity of reacting to the proper box in any setting.

The 2 crows each learned to solve problems one and two as listed above within some 50 trials, but failed even to improve consistently within 500 trials on problem 5. The chief reaction tendency manifested was that of entering consecutively the boxes either to the right or to the left of the first choice until successs was attained. Controls for particular settings were not used.

The 2 pigs each learned to solve problems two, three and five but failed to achieve complete success in problem four as listed above. In this last problem the pigs could succeed with short visual extents (three open boxes and to some extent with five). Apparently no clear cut reaction tendencies appeared. Controls for particular settings were used only in problem three. The results although not clear cut indicate a fairly general mode of response.

Of the 3 primates used by Yerkes in the last study two were macacus monkeys and one an orang utan. One monkey was tested on problems one, three and six. The first and last were solved. The second monkey succeeded with the three problems just mentioned, but failed on number four. The orang utan mastered problem one, but failed on number two. Control tests indicated that the first monkey was responding to specific settings. This is true also of the second monkey on problem three; but this second monkey reacted correctly to any series for his other two problems and the ape did as well on the one problem that he mastered.

No detailed analysis is offered for the failures made by the various subjects, although there are several possibilities aside from defective ideas.

This series of papers presents a very interesting case of the development of an interpretative point of view. In the beginning Yerkes's attention was directed to a study of reaction tendencies in the light of Hamilton's previous work. In the final papers reaction tendencies are rapidly slipping into the background. The emphasis is now upon the Multiple Choice method as a means of studying ideational behavior,—quite a different matter. In the reviewer's opinion the multiple choice method is applicable only to the study of reaction tendencies. Yerkes has not defined these, but his papers make clear that they are position habits which appear in the course of an animal's attack upon two or more simultaneously presented stimuli. The new element involved in his work and Hamilton's lies in the intensive study of the position (kinesthetic) habits which all experimenters have noted but which no one has sufficiently analyzed. The ideal of this work is undoubtedly to bring out phyletic differences in reaction tendencies.

The Multiple Choice method is important for the study of representative factors, ideational behavior, only if one of two (or both) assumptions are made; (1) The animals tested possess these factors and this method gives an opportunity for their expression. Or, (2) the problem must be solved by a perception of relationship and is therefore an ideational problem. Many quotations could be given indicating that Yerkes is apparently making both of these assumptions. It must be remembered with respect to the first one that if an animal possesses representative factors, it may almost never use them and then only when forced to in the absence of the stimulus at the moment of response. The second assumption has not been proved to present the only method of solution. Indeed Yerkes points out that most of the reactions were to particular settings. Where the reaction finally could be made to any setting, there is certainly a general response; but it has just as certainly not been shown that the stimulus for this response is a perception of relations. It is very important to remember that the subject is being taught to localize a certain point (box) in a variable visual extent (number of boxes). Because he can so localize, it does not follow that he perceives space relations. I feel sure that a dog could be taught to pick up sticks of variable length by either end or by the middle. Yet one would not therefore argue that he perceived the space relationship.

It is very difficult to study complex behavior without falling more or less into anthropomorphisms, and this is particularly true with primate subjects. Even Yerkes has heard the siren call. I quote one excellent example, and there are others: One monkey had hurt his foot in one of the boxes. Later during a test, a scraping sound occurred under the box while the monkey was in it. ". . . the instant the entrance door was opened, he jumped out excitedly. *He made no outcry, but as soon as he was out of the box, sat down, and taking up his right foot, examined it for a few seconds.* Having apparently assured himself that nothing serious had happened, he went on unconcernedly about his task. . . . Psychologically dedescribed, the sound induced an imaginal complex equivalent to the earlier painful experience. The behavior seems to the writer a most important bit of evidence of imagery in the monkey" (p. 38).

From Yerkes's statements about the Multiple Choice method his conclusion is unexpected, especially when one sees that he finds probably his chief evidence for ideational behavior not in the solution of multiple choice problems as such, but in the following partly accessory data: (1) The learning curve for the ape descends from high to low over night. (2) A comparative study of a child and the ape upon a box stacking experiment revealed a close similarity, although the child manifested a greater variety of modes of procedure. "No unprejudiced psychologist would be likely to interpret the activities of the orang utan in the box stacking experiment as other than imaginal or ideational" (p. 97). The reviewer fears there are many psychologists who, on the basis of data so far available, would interpret the behavior in stimulus-response terms. The test is of particular human interest because of the suggestion it contains for future comparisons among the primates. The first point, concerning the form of the learning curve, has been debated before in the literature although never upon the basis of such a clear cut rapid drop as the ape's curve presents. In evaluating the present case, it should not be forgotten that the ape in attacking difficult problems was continually shifting suddenly from one method to another. One of these shifts was to the proper method. Hence the curve. The mere fact of "varying means" is found in all animals and the speed of the shifting seems correlated with the urgency of the need.

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Human Physiology. L. Luciani. (Trans. by F. A. Welby. Ed. by G. M. Holmes.) Vol. III, Muscular and Nervous Systems. London: Macmillan, 1915. Pp. x + 667.

Although the general work of Luciani is called human physiology, the present volume deals mostly with the physiology of vertebrates lower than the human. In ten chapters which cover over 600 pages are given the main facts respecting the muscular and nervous systems. One chapter deals with the general physiology of muscle, one with the locomotor apparatus, one with phonation and articulation, and the remaining seven with the nervous system.

This volume will be found valuable to psychologists who have interest in behavior, but especially to those who, irrespective of their objective or subjective standpoints, feel the necessity of knowledge of the functions of the different sections of the nervous system. Not only are the main facts recorded and dealt with in very readable fashion, but the work has a special value in that a large body of not widely known Italian literature on the functions of the nervous system has been included. Unlike many physiological texts the book deals frankly with psychological matters, and one of the final paragraphs is well worth quotation.

"By its investigations into the material conditions of human activity, physiology allies itself with the moral sciences. In the twentieth century it will pursue the scientific analysis of psychophysical phenomena without preconception or prejudice. It will not be hampered as in the past by animus to the concept of the soul, nor, on the other hand, will it fail to recognize that psychical development, even on the ethical side, depends to a large extent upon the somatic substrate."

Although the view is expressed that in animals there are combined cortical areas for both sensory and motor functions, in man it is admitted that the precentral area is almost strictly motor and the postcentral almost strictly sensory. The cortex, however, is not the only part of the brain which may subserve sensory functions. With respect to vision, for example, it is said that in a dog all or almost all of the so-called visual cortex may be removed without producing a blindness, but the facts upon which this conclusion is based we may interpret in a different fashion. In man, however, the blindness from a lesion in the calcarine area is more apt to be complete and permanent. Luciani appears, therefore, to hold to the view that in the lower animals there is a combination (or lack of differentiation) of the sensory and motor components of the cortex, and that there is an increasing areal differentiation of the cellular combinations as the brain develops phylogenetically. If this were more widely accepted we should have less useless controversy over the differences of interpretation by those who experiment with animals and those who observe patients with cerebral lesions.

The chapter on the cerebellum is one of the most valuable in the book. It contains an account of extensive work by the author and his pupils, which have helped to simplify our notions regarding the functions of that organ. The suggestions of the mental functions of the cerebellum are of considerable interest.

Some of the psychological statements are not as exact as could be desired, but the meanings are evident. The assumptions of certain mental-cerebral relations are those usually found in the writings of clinical neurologists. When a patient becomes aphasic 'he has lost certain memories or ideas' although 'his intelligence remains intact,' and in that condition there may be affected areas or centers for the 'motor images of words,' for 'phonetic verbal images,' and for 'visual verbal images.' These interpretations of clinical phenomena are also equalled by those referring to the activities of animals after the removal of parts of the brain. In Rothmann's dog with the cerebrum removed we are told that "mental activity was not entirely absent," and this is shown by the fact that the animal "learned to adapt its movements to the oblong form of its cage." So also, the pigeon with the cerebrum removed "shows marked defects which are most readily explained as the loss of memory impressions of previous sensations, owing to loss of intelligence properly so-called." Perhaps, however, we should not censure too severely a mere physiologist for anthropomorphisms which are paralleled in a percentage of contributions by comparative psychologists.

The author quotes with approval the opinion expressed by Foster that activities of all parts of the nervous system, independently or collectively, are accompanied by "some amount of consciousness." The spinal animal, therefore, would have a form or degree of consciousness or some primitive psychical processes.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

MEMORY, IMAGINATION, LEARNING, AND THE HIGHER INTELLECTUAL PROCESSES (EXPERIMENTAL)

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I. Memory and Imagination

(*a*) *Discussions of General Questions.*—Müller-Freienfels (38) points out that investigators of memory have almost invariably employed a procedure which consisted in memorizing intellectual materials, and hence their findings have not done justice to the affective aspects. One's remembrance of Venice or of a snake contains affective components which are no less significant and no less essential than the intellectual components; memory is made up for the most part of feelings, and in many cases of remembering no reproduction of sensory content takes place. The affective and volitional factors play an important rôle in that they increase excitability, they contribute to an orderly arrangement of contents, and they bring it about that the individual shall have these contents at his disposal for definite purposes. The author differentiates three sorts of memory: *Orienting memory*—which manifests itself not in a reproducing of intellectual contents from past experience but in certain attitudes (attitudes of being known, of being familiar, of being different and the like); these affective and attitudinal contents serve as cues to orientation—that is, they enable me to take up an attitude toward things and men when I encounter them a second time, although I may have no sensory remembrance of my previous experience with them. *Reproductive memory* consists in the reproducing of sensory and motor data from past experience. *Productive memory* makes use of these reproduced data but its function is one of free combining of the data; the difference between productive memory and creative imagination is a difference only in the "direction of the reconstruction" in the two cases—a differentiation which is not made clear by the author. These three sorts of memory represent three genetic stages, orienting memory being the primitive stage and productive memory representing the highest stage of memorial evolution. In a discussion of organic memory Dugas (18) identifies this function with motor memory, and regards it as an intermediate between "psychological memory" and the merely mnemic survival of certain physical and chemical effects. Organic memory has much in common with habit—indeed, habit is only a special form of memory; but in certain regards organic memory resembles "psychological memory"—an essential difference, however, consisting in the fact that while the one is a remembrance of acts the other is a remembrance of ideas. Adopting Maine de Biran's differentiation between mechanical, sensitive and representative memory, one would say that organic memory is a mechanical memory which may be sensitive but can never be representative. The function of organic memory differs from that of representative memory; and notwithstanding certain resemblances these two forms of memory differ both in their origin and in their nature. Organic memory originates in trials and gropings; it is irrational and blind; it does not proceed by reflection or reasoning; it is accompanied by feelings of a specific sort, but is not accompanied by ideas or images.

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[1] The writer is indebted for aid in the preparation of this paper to Professor Samuel W. Fernberger of Clark University.

In a paper on extraordinary memories, subnormal and supranormal, Dugas (19) cites numerous illustrations (idiots, mathematical prodigies) to show that extraordinary memories differ not in nature but only in degree from normal memories; they are variants in the direction of enlargement or diminution but not in the direction of transformation. They may all be explained from the laws of normal memorial functioning, and they in turn throw light upon these laws. While supra-normal memories always presuppose a high degree of fundamental endowment (natural retentiveness) they show that understanding is an invaluable aid to memory. In his study of chess-players Binet has demonstrated that the most marvelous memories are those which have recourse to reasoning and the relations of ideas; and Dugas reaches a similar conclusion

—namely, that the most efficient supranormal memory is only a good natural memory which has been raised to maximum efficiency by superior organization.

(*b*) *Imagery.*—Weber (51, 52) alleges that the imaginal content of day-dreams is dominantly auditory while sleep-dreams are characterized by a predominance of visual content; and he confirms this statement by illustrations from mental pathology which show that hallucinations tend to be auditory by day but visual at night. This remarkable alternation of modality is traced to the following source: At the time when primitive man was in danger of being attacked by nocturnal enemies, it was essential that he should "post a sentinel"; and since the sentinel must be independent of illumination, this duty devolved upon the sense of hearing. In consequence of this state of affairs it became expedient that the operation of auditory imagery (auditory hallucination) should be reduced to a minimum during the night in order that auditory perception should then attain maximal efficiency. Miss Gordon (23) reports an investigation of mental imagery in which Miss Fernald's spelling-test was employed. Words were presented in auditory fashion to five adults and twenty-five children who attempted to spell them backwards, and who afterwards described their procedure. It turned out that certain observers employed complete visual images (global images of the whole word), others employed fragmentary visual images (of but a single syllable at a time), while others had recourse to auditory and articulatory images. The employment of the global visual image proved to be the most advantageous procedure, those individuals who employed fragmentary visual images being no more efficient than the non-visualizers. Miss Martin (31) advocates the view that whether one shall see ghosts or not depends upon whether or not one tends, especially when under the stimulation of emotion, to project one's visual images into space; and this view she supports by citing evidence obtained from three students. When visual images are projected under laboratory conditions they do not possess the "reality" of apparitions; the image must have an emotional accompaniment which marks it off from other projected visual images. (See also Aveling, Lunniss, Moore.)

(*c*) *Association and Inhibition.*—Wohlgemuth's investigation (55) was undertaken for the purpose of deciding between the claims of the rival theories of simultaneous and successive association—that is, between those theorists who hold that mental contents must be present simultaneously if an association is to be established between them, and those who hold that in consequence of the narrow range of consciousness we can not attend to two contents simultaneously, and hence successive presence in consciousness must suffice for the establishing of associations. Wohlgemuth's experiments consisted essentially in presenting colors and forms in paired arrangement, varying the conditions in such fashion that the two members of the pair were exposed simultaneously in certain cases, successively in other cases; and in instructing his learners that the two members of a pair were to be attended to simultaneously in certain instances, successively in other instances. The effect of the learning was measured by a combined correct-associate method and recognition method. It was found that simultaneous presentation gave rise to slightly more efficient recognition (about 8 per cent.) than successive presentation, but the recognition-time was identical in the two cases. The variation in instructions was attended by less equivocal results; here simultaneous attending proved to be much more effective than successive attending. The author concludes that all associations are due to simultaneity.

Hollingworth (25) investigated the relation between articulation-time and association-time. Is it true that pure association-time is constant, and that only the time required for articulating the reaction-word varies from individual to individual? The method consisted in first determining the association-time for nineteen reagents (naming of colors, naming of opposites) and then in determining the time required by each reagent for reading all of the names of colors and names of opposites which he had articulated in the preceding association-reactions. It was found that while there is a fairly high correlation between reading-time and association-time, the latter is about twice as long throughout as the former. It is apparent that a considerable time is required for the process of association itself, that individuals vary widely in rapidity of association, and that women are probably more rapid than men.

It has been reported that when in the association-reaction a list of stimulus-words is re-presented the reagent responds, in a surprisingly large number of cases, with the same reaction-word as in the earlier sitting. Claparède (12) investigated this phenomenon by the following method: He presented stimulus-words and instructed his reagents to respond with the first associated word; in another experiment he presented pairs of logically related words and instructed his reagents to write the second word of each pair.

In a subsequent experiment in association-reaction the first members of these logically related pairs served as his stimulus-words; and in yet another experiment in association-reaction he re-presented the stimulus-words which had been presented in the first experiment. The interval between presentation and re-presentation varied from one minute to one week. The results show that "created associations" are much more permanent than "presented associations,"—that is, the associated words which had been supplied by the reagent himself were much more frequently reproduced in the re-presentation sittings than the associated words which had been furnished by the experimenter. Claparède concludes that this phenomenon is not due to the greater mental activity involved in the case of the created associations; he fails to find a satisfactory explanation. A qualitative analysis of association-reactions (one hundred and thirty defective children, with two hundred normal children as a control) leads Miss Otis (40) to differentiate five types of response: Repetition of stimulus-word; non-logical associations; phonetic associations; poly-verbal associations; uni-verbal associations. These various types she describes in detail, pointing out certain characteristic differences between normal and abnormal children. Crane's investigation of the association-test (13) convinces him that this test is not a reliable means of disclosing the presence of guilty knowledge. The association-reaction is lengthened by various factors: Certain verbal forms of stimulus-word; the advent of visual imagery; the presence of competing association tendencies; momentary absence of association tendencies; emotion; volitional inhibition of association tendency. Miss Wilson's investigation (54) of controlled association is essentially a repetition of Watt's experiments—the six tasks consisting in finding a reaction-word which would be coördinate, superordinate, subordinate, etc. The introspections of her four reagents are so jejune and so unanalyzed as to leave the reader wholly in doubt as to what really was present in consciousness. In an introspective investigation of the free association-reaction Roels (43) found that a process of consciously searching for a reaction-word is present in about one third of the cases. (In one of the four reagents this searching process occurred in about sixty per cent. of the cases—a difference which the author refers to a difference of *Einstellung*.) Among the factors which direct the searching, consciousness of relation is most frequent; other determining factors—such as imagery, "sphere of reference," mechanical factors and the like—may, however, play a more important rôle in certain reagents. The process of searching may appear at different stages of the reaction-consciousness; it may manifest itself at the first instant of the experience, in consequence of a specific attitude of the reagent, but it usually does not make its appearance until later. The efficacy of the searching varies widely from individual to individual; searching usually lengthens reaction-time, but in cases where the searching is directed by imagery it accelerates the reaction.

In a study of retroactive inhibition DeCamp (16) presented lists of nonsense-syllables followed by intervals of rest or of work (mental multiplication) or by various distributions of rest and work. An examination of the number of *Treffer* and of the *Treffer*-times in the various cases leads the author to the conclusion that it is exceedingly doubtful whether retroactive inhibition plays any significant part in influencing the recall of nonsense-syllables. He found no positive introspective evidence of the existence of retroactive inhibition nor did his inexperienced learners furnish any evidence of it. DeCamp advocates the view that retroactive inhibition may be present when identical or partially identical groups of neurones are involved in the learning of the syllables and in the subsequent mental work.

(*d*) *Recognition.*—In an investigation of the differences between recall and recognition Miss Mulhall (37) employed three procedures: Pictures of objects, geometrical forms, words and nonsense-syllables were presented and re-presented until her learners were able to recognize them and to recall them without error; she also presented nonsense-syllables and photographs, in one case instructing her observers to determine to remember them, in another case without determination—and in both cases she subsequently tested recall and recognition; she presented nonsense-syllables and photographs in an invariable order—with a view to discovering the influence of primacy and recency upon recall and recognition. It was found that the difference in the number of repetitions required to insure recall and to insure recognition was greatest in the case of pictures, less in the case of forms and words, and least in the case of nonsense-syllables—from which the author concludes that the difference between recall and recognition seems to depend in part upon the richness of associations present; intent to remember has an influence upon recall but little or no influence upon recognition, this influence being greater in the case of names than in the case of nonsense-syllables; the factors of primacy and recency have a greater influence upon recall than upon recognition, and a greater influence in the case of significant materials than in the case of non-significant materials. In an investigation of the influence of localization upon recognition Viqueira (**49**) presented lists of sixteen nonsense-syllables arranged in the form of a square. The recognition-test—after an interval of nine minutes—consisted in presenting a similar square containing four new syllables and twelve old syllables, some of the latter occupying their original positions and some occupying new positions. Results obtained from nine observers show that a syllable is recognized more readily and more correctly when it occupies its original position. Fischer (**22**) returns to the question as to whether the process of recognizing does not demand the presence of a reproduction-tendency. His materials consisted of variously different groups of dots and he attempted to answer two definite questions: Is recognition-time shorter when the reproduction of the object to be recognized is facilitated in advance? Does rapidity of recognizing result in an impairment of accuracy? His results show that the former question is to be answered in the affirmative, the latter in the negative—from which he concludes that "a slight degree of subliminal reproduction seems to be necessary for immediate recognition; at any rate it certainly aids immediate recognition."

Feingold (**20**) first attempts to quantify the degrees of similarity of certain stimuli (words, colored postcards), and then he employs these stimuli in an endeavor to determine what is the relation between degree of similarity and degree of recognitive ability. His objective results are formulated as laws of recognition: Recognitive ability decreases with increase of similarity; recognitive ability varies inversely as the number of objects exposed when the exposure-time is the same for each object and is not longer than one second; recognitive ability varies with exposure-time, the number of objects being constant. The introspections show that the recognition of dissimilarity results from the fact that the dissimilar stimulus arouses a shock of strangeness, a different mood, or a different kinæsthesis; or results from the fact that the dissimilar stimulus fails to fit in with the memory-image of the former stimulus. The perception of a similar card tends to evoke a generalized image of its mate; the author believes, however, that imagery plays only a secondary rôle in recognition. He concludes that "the process of recognition is affective and is independent of cognition," although he mentions the fact that "most cases of false recognition are due to the obliteration of the original impression by the present perception." In Miss Fildes's study of recognition (21) incomplete and unusual pictures of familiar objects were presented visually, and familiar objects were presented tactually—the observer being assigned the task of recognizing them and describing his experience. It was found that the most frequent contents of the recognitive consciousness were kinæsthetic sensations from eye-movements, images, attitudes or feelings, and "thoughts." The author concludes that the sensations and images play no essential rôle in the process of recognizing; she failed to determine what is the rôle of the attitudes or feelings.

In Owen's experiments (41) stimuli—colors, letters, numbers, geometrical forms, or nonsense-syllables,—were presented in pairs. Then after an hour's interval one member of the original pair was re-presented either in combination with a stimulus chosen from another pair of the original series, or in combination with a wholly novel stimulus. The observer was asked to report and describe his recognitive experience in each case, *i. e.*, he was asked to determine whether the present stimuli had been presented previously, whether they had been presented together, whether they had been presented together in the present order. Notwithstanding wide individual variations it was found that observers are more likely to recognize that old stimuli are old than to detect that new stimuli are new. Among the factors which seem to contribute to recognition are the behavior of visual imagery (stability, localizedness, promptness of advent), certain kinæsthetic experiences, and certain associative characteristics; neither specific organic sensations nor typical moods nor characteristic behavior of attention seem to play a significant rôle in the process of recognizing. The author differentiates and describes five classes of recognitive judgment; and he devotes additional experiments to an investigation of recognition-time, "selective" recognition, recognition of voluntarily recalled materials, the rôle of congruity of context, and the differentiæ of memorial and imaginational images. Miss Woods (56) undertook to analyze the process of recognizing. She chose stimuli which would appeal to various sense-modalities—musical compositions, the alphabet of the blind, odors, and several variants of letter-form (faces of type); and her method consisted in presenting and re-presenting these unfamiliar stimuli in successive sittings until her observers became familiar with them. She obtained an introspective description of each process of recognizing; and a comparison of her successive cross-sections through the recognitive consciousness enabled her to analyze the process and to trace out such variations in its form and content as occurred with progressive increase of familiarity. The process of recognizing was found to be essentially similar for the various sorts of stimulus material and to be characterized throughout by the presence of kinæsthetic and organic components. The recognizing of relatively unfamiliar stimuli differs from the recognizing of familiar stimuli in that the former is attended by a wealth of definite and detailed imagery while the imaginal content of the latter is either sparse and fragmentary or is wholly lacking (save for the motor or organic components which never fail to appear). Affective toning is not an invariable constituent of recognition at any of its developmental stages. The process of recognizing was attended throughout by a characteristic behavior of attention; this consisted in the dominating of a recognition-*Aufgabe* in consequence of which attention moved in a given sequence from perception through appropriate reaction to subsequent relaxation—more or less definite activities of comparing and contrasting being present in the earlier developmental stages of the process (relatively unfamiliar stimuli). Recognition is a sequential experience which may be analyzed into components; it is an on-going consciousness of activities, of pauses, of adjustments of attention; and its *sine qua non* is an orderly procession of mental events which proceeds from perception through appropriate reaction to final shift of attention, this procession being under the direction of a specific *Aufgabe* or *Einstellung*. A. L. D. (14) advocates the view that certain cases of false recognition may be explained from the fact that the contents of dreams or of actual experiences may still survive in such dim and diffuse form that they are imperceptible, although they may serve to arouse a process of recognition.

(*e*) *Learning, Remembering, Forgetting.*—In an investigation of the influence of articulation upon memorizing Zucarri (57) employed ten learners of different age, sex, and degree of education. Selections of prose and poetry were learned under natural conditions and under conditions where articulation was inhibited by counting aloud. It was found that memorizing was impaired by the inhibition of articulation—memorizing without articulation requiring on the average about seventy per cent. more time than memorizing with articulation; and a subsidiary experiment indicates that the impairment was due not to distraction of attention but to the non-participation of articulation. An experiment by Misses Mould, Treadwell and Washburn (36) consisted in memorizing nonsense-syllables in various fashions—with and without intervals between successive presentations, and by learning-methods in which articulation was emphasized, was voluntarily inhibited, and was inhibited by distraction. The results obtained from one hundred and forty-four learners show that distributed repetitions are more efficacious throughout than accumulated repetitions; and since this advantage is much greater in cases where articulatory processes are emphasized the authors conclude that Jost's law is primarily a law of motor learning. In an investigation of the effect of rhythm upon learning Adams (1) read lists of digits to his classes (one hundred and eighty learners) and tested the learning by immediate recall. The rhythms which he employed in presenting the digits were trochaic, iambic, dactylic, amphibracic, and anapæstic, together with a non-rhythmic presentation. It was found that while rhythmic presentation is in general superior to non-rhythmic, yet trochaic presentation is sometimes inferior to non-rhythmic presentation; dactylic presentation proved to be most advantageous for men and anapæstic presentation for women. Adams (2) attempted to determine the relative value of a full-page advertisement presented once, a half-page advertisement presented twice, a quarter-page advertisement presented four times, and an eighth-page advertisement presented eight times; one hundred men and one hundred women served as subjects in the experiment and the values were determined by a method of immediate recall. The results show that the highest memorial value attaches to the eight presentations of the eighth-page and the lowest memorial value to the four presentations of the quarter-page. In an investigation of the effect of obstructed breathing upon learning Arnold (3) in one case plugged the nostrils of his learners in such fashion as to obstruct breathing, and in another case inserted a hollow plug in such fashion as to provide an equal distraction of attention without obstructing respiration. Groups of letters or digits were memorized under these two conditions, and retention was tested by immediate recall. It was found that obstructed breathing results in a loss of from ten to thirty per cent. of the learning effect.

In his memorizing of lists of digits Rückle reached the conclusion that his learning-time varies with the square of the number of digits in the series. Schultze (44) finds that this law holds for longer lists (containing more than one hundred and forty-four digits), the deviation becoming greater the shorter the list. This circumstance indicates the existence of a second law whose operation is especially effective in the learning of shorter lists; and further investigation shows that the total time for learning any list is a composite product of the number of groups made by the learner in his memorizing, of the number of readings required, and of the average duration of the particular readings. Schultze's formula enables him to calculate learning-times with an average deviation of 3.5 per cent.; and he raises the question as to whether we are not here concerned with a general law of human work. Lambrecht (28) presented nonsense-syllables and colored forms to twenty-one learners; and the procedure was such that any given form was presented in the same color throughout in certain cases but in a different color at each presentation in other cases; in the recognition-test which followed after twenty-four hours the form was presented either in the color which it had possessed throughout the original presentations or in a color which it had never possessed in the original presentations. The results show that it is not possible to ignore color and learn form alone; if the form presented in the recognition-test possesses a "new color" it is more likely to be recognized in cases where its color was constant throughout the original presentations; when a form is associated with a syllable the former will more likely reproduce the latter in cases where it bore the same color throughout; when a syllable is to be associated with a given form the association is stronger when the color of the form remains constant throughout the presentations than when it is varied.

Since the independent function of each of the several factors which cooperate in the act of learning has never been fully investigated, Michotte and Franzen (33) undertake to isolate these factors and to investigate the isolated function of each (grouping the material; associations between adjacent members and between remote members of the series; perseverative tendencies; localizations; general physiognomy of the series; identification; memorial aids and devices of miscellaneous sorts). Their method consisted in presenting lists of nonsense-syllables and subsequently in re-presenting them in transposed order; and in devoting different numbers of repetitions to the various acts of learning—*i. e.*, in bringing the act of learning to varying levels of perfection in the various cases. They found that the re-learning of a list of syllables in transposed order required a greater number of repetitions than had been necessary for the original learning half an hour previously; and variations in their experimental arrangement enable the authors to show that this excess of repetitions is due to the fact that the perseverative tendencies decay rapidly during the first half-hour of their existence. It was found that learning does not proceed in a constant and straightforward direction, but that different members of a series of repetitions give rise to widely different effects; this phenomenon is subject to individual variation and can not be formulated in a single general statement but it may be illustrated from the results obtained in the case of one of the learners: The first five repetitions gave rise to perseveration but contributed little to the establishing of associations; the next five repetitions served to establish and consolidate associations; the next ten repetitions resulted in identifications; and the final group of ten repetitions had a special effect upon identification and perseveration. When complete learning is followed by additional repetitions of the material (over-learning) these additional repetitions have a different effect upon the various factors of memorizing according to the attitude adopted by the learner; their chief effect, however, is upon perseveration. The chief effect of the inhibition which results from a former learning of the material in a different order consists in a period of inertia at the beginning of the act of re-learning; the inhibition also manifests itself in a less prompt recitation of the relearned series.

Kortsen (27) prepared a questionnaire in which he asked his correspondents to describe their earliest remembrance, the remembrance which first comes to consciousness when they think of the first ten years of their life, of their seventeenth and eighteenth years, of their life at high school, of the past year, of yesterday. He received replies from sixty adults at the universities of Copenhagen and Paris and from thirty girls in Germany, nine to ten years of age. An analysis of these replies leads Kortsen to the conclusion that whether one shall remember an incident or not is determined not by any "law of interest" but by the physiological condition of the organism at the time when the incident was experienced. Chamberlain's experiments (10) aimed to determine whether immediate recall is influenced by age, sex, interest, and by isolated as opposed to grouped presentation. The materials employed were fifteen familiar objects (doll, pocket-knife, and the like) and the subjects were thirty girls and thirty boys from each of three school grades. It was found that efficiency in immediate recall improves from the third to the fifth grade but shows no improvement from the fifth to the eighth grade; objects presented in groups of three are recalled slightly better than objects presented singly; no influence of sex or interest upon recall was revealed by these experiments. Brown (8) asked a class of one hundred and seventy-five students to recall the advertisements which they had seen recently in street-cars. An examination of their reports reveals the fact that the average person recalls most readily those items which many other persons can remember—the items in the shorter reports are not determined by individual or special conditions but are simply the items which are most readily remembered.

The purpose of Michotte and Portych's experiments (34) was to determine what is the influence of lapse of time upon the number and nature of memorial aids. Pairs of logically related words were presented; after various intervals (a few minutes, twenty-four hours, several weeks) reproduction was tested and an introspective analysis was made of the factors which had coöperated in the recall. The authors devote most of their discussion to those reproductions which were not directly initiated but were introduced by an intermediate content. The intermediates which serve to introduce the reproduced datum were found to vary in complexity—the reproduction coming about through the medium of a single intermediate in certain cases, while two or more intermediates were interpolated in other cases. Reproductions after twenty-four hours proved to be due to more complex intermediates than reproductions after a few minutes or after a week. The intermediate terms were of various constitution; the authors classify them under four heads; Reaction-words which came to consciousness but were rejected; visual images; consciousness of relation; non-relational thoughts. Rejected reaction-words are relatively infrequent in reproductions after a brief interval; they are much more frequent in reproductions after twenty-four hours and after one week. Visual images and consciousness of relation are about equally numerous throughout; non-relational thoughts are relatively frequent in delayed reproductions.

Myers's investigation (39) of the relation between affectivity and recall consisted in asking his subjects (two hundred and thirty-two pupils in normal schools, high schools and grades) to write such names of foods, animals, colors, books, musical instruments and persons as first occurred to them; and subsequently in asking them to specify those foods, animals, colors, etc., which they liked most and those which they liked least. The records show that the thing liked most on the average appears much nearer the top of the list in random recall than the thing liked least; the percentage of disliked objects which are not included in random recall is always much higher than the percentage of liked objects which are not included; the average position of the most liked object is always above the median, while the average position of the least liked object is almost invariably below the median. Myers concludes that it is safe to infer that one tends to remember the agreeable rather than the disagreeable. Jones (26) advocates the view that all forgetting is due in part at least to repression. Psychoanalysis shows that the unconscious content of mind is enormously great, and that these unconscious complexes possess an exceedingly great assimilative capacity. In consequence of this the ramifications of associative connections throughout this unconscious mass are so far-reaching and so intricate that no one can state that a given idea has never been associated with an unpleasant complex. Moreover, mental economy demands that consciousness should not be burdened with irrelevant contents which might obtrude when concentration in another direction is essential. Why should not the existing mechanism of repression serve for this "utilitarian" repression as well as for "hedonic" repression? And why should one not suppose that all selective thinking is at bottom a product of this extended principle of repression? Miss Dawson (15) reports that a group of high-school graduates and normal-school students were unable to identify common plants and trees, or to locate important buildings in the city where they resided. Diller (17) believes that the loss of memory alleged by murderers is genuine and not feigned, and that this phenomenon is due to intense emotional disturbance. Tidyman (48) holds that Rice's investigation of efficiency in spelling is defective and inconclusive in that subjective conditions can not be revealed from an examination of purely objective conditions.

(*f*) *Practice and Transfer.*—Bradford (5) investigated the influence of practice, fatigue, distraction and physiological condition upon the forming of associations; his statement of his findings throws no new light upon the problem. Chapman's forty-six subjects (11) added continuously throughout ten ten-minute periods, a record being kept of the performance of each individual during each two minutes of the ten-minute period. These records show the presence of an "initial spurt"; more work was done during the initial two minutes than during any subsequent two minutes. In Thorndike's experiment (46) six hundred and seventy college students added forty-eight columns daily for seven days. When the students were classified into groups on the basis of initial ability it was found that the practice curve of each group assumed the form of a straight line, excepting in the case of the two groups who had possessed the greatest ability at the outset. One of these two latter groups showed more practice effect than any other group, the other showed a loss instead of a gain. The author inclines to the view that the difference between his practice curves and practice curves of the traditional form may be explained from a difference in interest. In another experiment where one hundred and twenty-three students practiced multiplying numbers Thorndike (47) found that the greatest gross improvement was shown by individuals who had possessed the greatest initial ability. This finding indicates that individual differences in intellect and skill can not be explained from differences in opportunity, and that the status which an individual has attained through a given amount of practice is highly prophetic of his attainable status. In an investigation of the retention of acquired capacities Wells (53) had recourse to the tapping-test, the adding-test and the cancelling-test. Reagents who had taken part in an earlier investigation (where skill had been acquired by practice) were again available, after an interval of five and one-half years in the case of the tapping-test, and after two years in the case of the other two tests. Wells finds that the lapse of several years resulted in a loss of about one-half of the improvement in efficiency which had been acquired in thirty days' practice during the original experiments; and it turns out that the reagent who loses much in one function also tends to lose much in another function. Loss from disuse seems to be a more generalized property of the organism than gain from practice; the capacity to acquire skill may be high for certain functions and low for others, but the tendency to forget seems to be more nearly equal for the various functions.

Brown (6) practiced forty-five subjects for twelve days in naming colors and in reading names of colors from a printed list. The words were read more rapidly than the colors were named; on the last day of practice the average time required for reading a word was .29 seconds, and for naming a color .41 seconds. The effect of practice upon naming was considerably greater than its effect upon reading —26 per cent. as compared with 17 per cent.—but it seemed evident that but slight additional improvement in color naming could be expected to accrue from additional practice. Hence the author rejects the explanation which has been advanced (Cattell, Quantz) to account for one's lesser rapidity in naming colors—namely, that this is due to the fact that one has had less practice in naming colors than in reading words. In order further to confirm his criticism of this view Brown arranged an additional experiment where the names or parts of the names of the colors were presented with the colors to be named; it was found that even under these conditions the (facilitated) naming required more time than the reading. The author advances the view that the processes involved in reading words and in naming objects are fundamentally different. In a later investigation Brown (7) undertook to determine whether the process of number-naming is subject to the same time-consuming difficulty as color-naming. He found that more time is required to name the number of a small group of dots than is required to name the corresponding word or Arabic numeral—a result which supports the view that the naming of objects is a slower process than the naming of words. In another experiment Brown (9) found that ten practice periods in arranging gray papers (fifty different brightnesses; thirty-seven reagents) into a graded series yielded no practice effect; it turned out, however, that practice in the process of selecting four specified grays from the series of fifty resulted in an average improvement in rapidity amounting to nearly 50 per cent.

Smith's experiments in pitch discrimination (45) were carried through with several hundred observers of both sexes, varying in age from nine years to maturity, and representing widely different degrees of kinship, musical education and general intelligence. It was found that instructions as to the meaning of pitch usually resulted in an improvement in discrimination, but two hundred and six members of a group of four hundred and seventy-six boys and girls showed no improvement either from instruction or from practice; most of those who did improve were individuals who had manifested poor initial ability. Practice in pitch discrimination consists in acquiring control over a special group of cognitive factors (auditory sensitivity to pitch can not be improved appreciably by practice), and in acquiring skill in listening to tones. As skill increases, non-voluntary attention rises to a higher level—it is found that strained attention results in distraction—and the conscious factors become mechanized. Certain observers discriminate chiefly in terms of attributes of the tones themselves—they attend to the sharpness or the dullness which is characteristic of different pitches; other observers depend largely upon kinæsthetic factors—they tend to reproduce the tone audibly or mentally, and to discriminate in terms of kinæsthesis. In some cases imagery plays an important rôle; here the process of discriminating may be a process of comparing the stimulus with an auditory image; or visual imagery—localizations and spatial schemas—may furnish the criterion. The author describes various individual differences in form and behavior of attention.

In an investigation of transfer of training Poffenberger (42) trained four subjects (one hundred practices) in naming colors, in naming opposites, in checking numbers and in adding; the trained subjects and four or more control-subjects were tested by means of the form-naming test, the adjective-noun test, two forms of the number-checking test, and tests in subtracting, dividing, and multiplying. Transfer occured in certain cases, interference in other cases. The author concludes that neither transfer nor interference takes place in cases where the activity practiced and the activity tested contain no identical bonds between stimulus and response; that transfer takes place in cases where identical elements are present in the two activities and where previously formed bonds are involved; and that interference takes place in cases where one activity necessitates the breaking of previously formed bonds and the forming of new bonds. Wang (50) sought to determine whether training in one sense-modality transfers to other modalities; after training his subjects (seven children; forty-eight days) in differentiating visual extents he tested them in differentiating pitches, colors, and visual extents of other magnitude. Although the trained subjects showed a marked improvement in the activity practiced (a 40 per cent. decrease in number of wrong judgments) they showed no significant improvement in the non-practiced activities. In a second experiment the training consisted in checking those words which contained two or three letters from the second half of the alphabet, and the test consisted in checking words containing two or three letters from the first half of the alphabet; a very considerable transfer took place here. In a third experiment the training consisted in checking pairs of words which contained two letters in common, and the test consisted in checking pairs of words which contained three consecutive different letters. Here again there was a transfer, and it increased in amount with increase in age of the subject—subjects of different ages being found to employ different modes of procedure in their work. The author concludes that sense-training is a misnomer; that in those activities where transfer does take place it is due to the acquisition of an efficient method of dealing with the situation, and to an employment of that method in dealing with another similar situation; that the amount of transfer depends upon the efficiency of the method acquired. Martin (32) investigated the effect of practice in cancelling in one situation upon cancelling in other situations. His practice-subjects were thirty-six boys, eleven to thirteen years of age (with a similar group of control-subjects); and the practice extended over forty ten-minute periods. It was found that practice in cancelling English words containing both a and t resulted in a more rapid cancellation of Spanish words containing both a and t, but in a less accurate cancelling of Spanish words containing both e and s.

II. Higher Intellectual Processes

Aveling's paper (4) is essentially a re-statement and re-discussion of the findings obtained in his investigation of the consciousness of the universal.[1] The author recapitulates his view as follows: The sole contents of consciousness which are essential to thought are concepts; and these concepts constitute a class of mental contents which are not reducible to sensory elements or sensory complexes, or to affective and volitional processes. They must, therefore, be regarded as ultimate and irreducible mental elements. Without them it would be impossible to explain any cognitive process in the adult consciousness; and these cognitive processes owe their origin to no contents other than concepts. In cases where sensory elements make their appearance in connection with the concept they may as a general rule be regarded as a by-product of the concept, even when their advent modifies the subsequent course of consciousness. The only case in which the sensory content may be said to be essential to thought is the case in which the "particular" is present to consciousness. In other words, "conceptual thought" is essential to all intellection; and intellection can occur without anything else being present than "conceptual thought" or "imageless thought." In an investigation of the relation between imagery and meaning Moore (35) presented names of concrete objects, in certain cases instructing his observers to react when they understood the meaning, in other cases when a visual image of the object appeared in consciousness. It turned out that the reaction-time was considerably shorter in the former case than in the latter case

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[1] F. Aveling, *On the Consciousness of the Universal and the Individual.* London: Macmillan & Co., 1912, pp. x–255. See also Psychol. Bull., 1913, 10, 343f.; see also *Amer. J. of Psychol.*, 1913, 24, 276ff.

—that is, meaning appeared in consciousness more promptly than visual imagery; and the introspections also show that meaning seems "to be a conscious process *sui generis* distinct from [visual] imagery." In a second experiment names of objects were presented, the observer being instructed in certain cases to react when he understood the meaning or use of the object designated by the name, and in other cases when he had a concrete kinæsthetic or visual-kinæsthetic image of the object, *i. e.*, verbal imagery was not to be taken into account. Both the objective results and the introspections indicate that meaning is independent of concrete kinæsthetic imagery. In a third experiment pictures of objects were presented and the observers were instructed in certain cases to react as soon as they understood the meaning; in other cases they were asked to react by naming the object represented by the picture. Here again the advent of meaning proved to be more prompt than the vocalizing of the name, the introspections showing that the sequence was meaning, word, reaction. The author appends a discussion of the influence of the observer's attitude (where he holds that this factor is inadequate to explain his findings), and a discussion of the context theory of meaning. Miss Lunniss reports experiments (30) which were essentially a repetition of Bühler's; she presented epigrams, pairs of congruous or contradictory proverbs, and passages of descriptive prose or poetry[1] with such inquiries as: "Is this true?" "Do you understand this?" "Is this an apt description of autumn?" and the like. Introspections obtained from three observers seem to the author to justify the following conclusions: Imagery is not essential to thought; consciousness of relation, consciousness of rule or principle, and intention or reference (Bühler's *Gedankentypen*) are the essential components of judging and understanding; images and feelings constitute the indispensable contents of "supposal" (*Annahme*) but judging and understanding are based upon an awareness of the relation between the datum to be apprehended and some whole which has already been apprehended.

Harris (24) reports the results of an examination of fifteen thousand "judgments of number" made by three subjects during a period of two years. The subject took a handful of beans from a container and poured out, as nearly as possible, a specified number (twenty-five, fifty, one hundred or two hundred); he was permitted to make corrections but so rapidly as to preclude counting. All three subjects manifested the presence of a slight but significant personal equation—a tendency, common to all three subjects, to pour out too many beans. While the three subjects differed but slightly in personal equation, they differ distinctly in steadiness of judgment—two of them having a coefficient of variation amounting to 6.9 per cent. while that of the third was 8.7 per cent.

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[1] In numerous instances these passages contained one hundred and fifty words or more; and in certain cases passages of two hundred and thirty words were employed!

Lankes (29) investigated the intercorrelation of perseverations—his specific problem being: Is the individual who is characterized by a given degree of perseverative tendency in one function (sensory, motor or memorial) also characterized by a correspondingly high or low degree of perseverative tendency in other functions (attentional or temperamental)? As to his method, he assumed that rapidity of performance in the tapping-test furnishes an (inverse) measure of motor perseveration; that the liminal rate of rotation which obliterates flicker on a Maxwell disc furnishes a measure of sensory perseveration; that immediate reproduction of geometrical figures furnishes a measure of memorial perseveration; that ability to adapt oneself rapidly and effectively to a novel task furnishes a measure of attentional perseveration, and the like. Personal acquaintances of each observer in these experiments furnished estimates as to the persistence and perseverance of his character and personality. It turned out that there was no strong positive correlation between the tests and the estimates, although the situation is such as to indicate the presence and operation of some common factor throughout. The author concludes that the reason that his results turned out as they did is to be found in the fact that the perseveration measured by the tests is a native quality of the nervous system, while the perseveration measured by personal estimates of character and behavior is a combined product of this native quality and of the individual's own effort and will.

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MEMORY, CONCEPT, JUDGMENT, LOGIC (THEORY)

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The republication of four essays by Dewey from the *Studies in Logical Theory* (1903) and of a number of other studies in this field by the same author, appearing in various journals and now in part rewritten, including articles on *Judgments of Practice* (3), published during the current year, with an introductory chapter written expressly for this occasion, has resulted in a volume (2) affording a comprehensive and profoundly significant view of the growth and applications of the instrumental, functional, or experimental standpoint in logical theory. The psychological phases, as Dewey points out in the Preface, are written from the behavioristic standpoint, though some of them antedate the use of that term. The fundamental conception of the book is that of the essentially temporal development of experience, with reflective inquiry, inference, or judgment, and all that it may involve, appearing and normally functioning as an intermediate and mediating phase in this development. This conception, developed in the earlier essays largely with the view of criticising the then reigning idealistic logic, is now, in the introductory chapter, directed toward the criticism of the analytic logic of the new realism, with the result that the analytic logic, like the idealistic logic, is found guilty of the fault of temporal dislocation, since it starts from those objects with which science ends. Emphasis is laid, in the concluding portion of the volume, on the recognition of inference as itself a fact, and as a fundamentally important fact, something done naturally, spontaneously, through which absent considerations become involved as part of the present situation, a mode of behaving to a given situation as involving something not given, but a mode of behavior which may be exercised ill or well, a habit from which consequences disastrous or beneficial may flow, a creative act which may bring falsity or truth into the world, and which has led to the gradual and halting development of technique, the technique of experimental science, adapted to its safeguarding, utilizing, and setting free. Perhaps the most distinctive and positive development of the doctrine is found in the chapters on the *Logic of Judgments of Practice*, in which, as Schiller has pointed out (15), inveterate ambiguities are cleared up and much new ground broken. Schiller would go to the extent of regarding all judgments as conforming to the practical type, certainly all real, or live, judgments.

Crawford (1) has developed an instance of the use of the instrumental standpoint in logic as itself an instrument of analysis and criticism in the case of Mill's treatment of inference. Mill's logical problem is seen to be that of reconciling the associationism of the English empirical school with the procedure of modern physical science. Mill failed to harmonize inference and fact, since he unconsciously read back into facts the results of the work of inference in determining facts, so as to make inference seem to operate gratuitiously on already completely determined fact. Fact and inference therefore fell apart and in trying to find a vital relation between them Mill oscillated from one to the other. "His difficulties could be removed only by recognizing the ultimate unity of inference and fact, and developing their distinction only as an instrumental function in the process of knowledge."

McClure (11) institutes a comparison between the Cartesian dualism of mechanism and teleology, matter and mind, and the dualism in Plato of perception and thinking, both of which dualisms are regarded as marking perhaps the most significant metaphysical distinction. Implications of the Platonic dualism are worked out in modern form and in expressed sympathy with Dewey's analysis in "How We Think." The distinction between perception and thinking is sought in the presence of the time element in some and not in other reactions. Reactions to the immediate we call perception; reactions to the time quality we call thinking.

Shaw (16) concludes, after an historical survey of the subject that whereas logistic furnishes truth to the other branches of mathematics in much the same way that algebra does to geometry, or geometry to algebra, it is intelligence, not logistic, which draws the conclusions of logistic. Logistic has the right to exist as an independent branch of mathematics, but it is not the overlord of the mathematical world.

Lalande (10) contends that the rules of logic are generalized habits of life, social, linguistic, etc., and that pure logic is incapable of being realized by our minds. The practical need of distinguishing between lower and higher order habits is the opportunity of a truly ideal, or normative, logic, which is not a pure in the sense of a formal logic, but an orientation, indefinitely progressive. (In this connection attention may be called to a recent translation of Frege's attack on psychological logic (6).)

Guthrie (8) points out that although the various contributors to the volume on Logic in the Encyclopædia of the Philosophical Sciences fall in with the development of logic away from the conception of that science as a branch of psychology, yet a disconcerting survival of obsolescent psychologism appears in the position assumed by all of the writers, with the possible exception of Couturat, that logic is still a science of thought as distinct from expression. The critic champions the view that logic is concerned neither with the science or art of thought, nor with the truth or validity of ideas, but with the structure of discourse and expression.

De Laguna (4) discusses certain logical paradoxes for the solution of which Whitehead and Russell have devised the "theory of types," and contends that they involve the unwarranted assumption of a fixed relation between dual relationships and their terms. With this rigid abstraction exorcised, the cramp of the paradox disappears. The same problem is critically discussed by Guthrie (7), but less radically. In another article, De Laguna (5), adversely critical of Russell's logical-analytic method, attributes its fundamental error to its confusion of material event with sense datum.

Jones (9) restates the theory that there exist in the mind certain inhibiting forces, which tend to exclude from consciousness all mental processes which would evoke a feeling of "unpleasantness," and discusses its bearings on problems of memory under the headings of registration, conservation, recollection, and recognition.

Doubtless it speaks well for the truthfulness to life of the unfolding drama of logic that it is not without the interludes of comedy, afforded, now, by the motley of Mercier (12, 13) and his more or less serious critics, Thomson (19), Skelton (17, 18), and Pickard-Cambridge (14).

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VOCAL FUNCTIONS

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Few subjects of scientific reseach seem to be provocative of more varied and discrepant theories than stuttering. Coriat (2) considers it as a psychoneurosis to be treated by psychoanalytic methods. The attempt to repress into the unconscious certain trends of thought or emotion, usually of a sexual nature, develops the defective speech automatism. Stuttering is a defense mechanism, to hide from consciousness painful memories and undesirable thoughts, in order that they may not be betrayed in speech. All stuttering, with its hesistation, its fear, its disturbing emotions, is a kind of an association test in every day life and not a phonetic disturbance. Coriat vouchsafes no detailed clinical accounts of his cases and adduces no evidence which would appeal to a scientific reader in support of his convictions. Instead, he elaborates the theory, and applies it with a comprehensiveness which provokes the wrath of at least one reader, himself a stutterer. Solomon (10) in a vigorous reply, charges the whole Freudian school with evasion of the real issues and demands that they retrace their steps and first prove the soundness and validity of their fundamental theories before seeking to enter new territories. In particular is he apprehensive of the disastrous consequences of applying Freud's sexual theories to stuttering children. "I cannot do otherwise than look upon this as positively anti-social. It would, it is my belief, be a glaring and rife source of danger to the community for these ideas to be spread broadcast."

At the opposite extreme from what Solomon stigmatizes as the "inflated theory" of the psychoanalysts, is the hypothesis of Browning (1) who publishes detailed clinical reports on twenty-five stutterers and twenty controls in support of his view, first announced in 1910, that stuttering is "associated at the start with large thymus, if not directly caused thereby." The thymus, which normally diminishes in size during childhood and largely disappears, was in evidence in every case of stuttering, careful percussion revealing the characteristic "thymic dulness" in the region of the sternum. In only one of the controls was this hyperthymism found, and this boy proved to be subject to some speech difficulties! Browning holds that stuttering is not primarily a disorder of the speech centers or of the central nervous system. It is not an isolated or merely functional affair, but it is always, at the start and before it becomes fixed as a habit, a symptom and part of a widespread or systemic condition. This general condition is a phase of hyperthymism or lymphatism, due to some block in the thymic area usually attributable to enlargement or persistence of the thymus. The morbid influence thus exerted on the organs of speech is characterized as an inhibitory reflex. Systemic conditions, circulatory troubles, and interference with free respiration, as well as imitation, fright, amnesia and other causes, are recognized as possible accessory influences; but hyperthymism is deemed to be the fundamental cause. Enlargement of the thyroid is more common in girls, while boys are more subject to enlargement of the thymus. This fact (which, by the way, is less clearly substantiated than most of the positions taken by this author) serves to explain the relatively small proportion of female stutterers, when coupled with the fact that the thoracic type of respiration tends to keep the female vocal apparatus free from the baneful inhibitions which a troublesome thymus might otherwise exert. Browning has used with some success local treatment of the thymus with the Roentgen ray, in addition to systemic and generic hygienic treatment.

Makuen (8), physician of wide experience in treating stutterers, would agree with Browning that fear, autosuggestion, imitation, etc., are merely secondary factors in the etiology of stuttering; but, like Bluemel, he holds that the primary factor is aphasic. The stutterer is auditory-kinesthetic in his speech imagery. Kinesthetic controls enable him to enunciate the initial consonants, but temporary amnesia for the sound of the vowel quality interferes with correct phonation. Makuen thinks this partial auditory-motor aphasia—what he calls the primary cause—is generally congenital and hereditary. Such beneficial results as have attended the use of elocutionary methods of treatment are mainly due to the resulting improvement in the stutterer's mastery of auditory speech imagery; and these benefits have been multiplied when the training has been carried on with this purpose distinctly in view and with the attention of the patient consciously focused upon the imagery. In passing, Makuen pays his compliments to psychoanalysis which in the treatment of stuttering "has proved to be an absolute failure." He would doubtless look askance also at Freudian explanations, such as Ferenczi (5) gives, of cases where men use now the masculine and now the feminine vocal register in talking.

Evans (4) has gathered a few illustrations in support of the theory that anatomic considerations have had a share in determining which speech sounds are used to express certain ideas. For instance, in eight languages, the word "to eat" employes a dental consonant, while the word "to drink, to gulp" uses a guttural.

Pillsbury (9) indulges in a tilt at Wundt's account of the mental antecedents of speech, maintaining that the idea to be expressed is not necessarily present in consciousness in advance of analysis and expression. What is present is a general intention. This arouses a series of verbal associates, which are accepted or rejected according as the fresh connotations which they bring with them are felt to harmonize with the original intention.

The speed of the associative process in comparison with the speed of articulation is measured by Hollingworth (7) who shows that in the color-naming test and in the opposites test, the individual differences are only in small measure due to differences in rapidity of articulation. His women subjects, by the way, were clearly superior to the men in facility of speech.

A monument of patience and prodigious industry in amassing data is Givler's (6) investigation of the esthetic effects produced by the speech elements in poetry. A preliminary statistical determination of the relative frequency with which the various sounds occur in each of the leading English poets from Sydney to Rossetti, revealed characteristic differences and led to psycho-physiological experiments aimed to measure the dynamic effect and the affective quality of these speech elements when combined in simple relations. The subject spoke prepared iambics of meaningless sounds and simultaneously beat the rhythm with his free-moving finger. The rate and extent of the finger movement, graphically recorded, furnished an index of the dynamogenic effects of the speech elements used. Introspective reports were gathered regarding the accompanying affective consciousness. Transmutations of the sounds in actual lines of poetry representative of the different poets, were used in a similar manner. The results are far from clear-cut and definite, as must be expected in the search for so elusive a factor in poetic beauty. They are, however, of a nature to support the author's insistence on a rehabilitation of the tonal theory of poetry.

The last article to which reference is made is written not by a scientist but by a woman who while achieving distinction as an actress has also thought about the psychology of her art. Henrietta Crosman (3) records her theory of voice control, illustrates the significance of pitch, loudness and duration, and describes one of the associative mechanisms which she has found useful as an aid in commanding a desired quality of the voice. To simulate an emotion she thinks of its color: deep red for passion or power; lavender for gentleness; bright yellow or gold for wit; gray for sordid feeling; sky blue for restlessness, and sea blue for repose.

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GRAPHIC FUNCTIONS

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The handwriting investigations of the past two years have emphasized, largely, two interests: (1) the utilization of writing as a material for testing various mental functions; and (2) the extension of methods for measuring proficiency in handwriting.

An experiment designed to test the conditions under which automatic writing occurs is reported by Downey and Anderson (6). Several methods were employed to produce automatic writing, such as writing a memorized verse while reading silently and aloud or doing sums in mental arithmetic; writing to dictation while reading aloud or answering questions under the same conditions. When simultaneous processes were run a careful record was made of the rapidity of each process and this speed compared with the speed under normal conditions. Complete introspective reports were obtained. The time records show a close approximation in certain instances to the normal speeded rapidity of each of the simultaneous processes. Usually, however, the retardation in writing speed was just about that which would cover the mental vocalization of the words written. From the introspective side material was gathered concerning lapses of awareness. The progressive failures in memory as the reagents learned with practice to concentrate upon reading; the fact that just about as much could be recalled at the close of a one- as at the close of a three-minute writing interval in the dictation experiment; the gradual loss of meaning, no doubt through breaks in connection; the more evident failures of memory when the reagents were in bad physical condition, led to the conclusion that all lapses reported were memory lapses which approached as a limit a completely dissociated mental bit. This experiment emphasizes the need of checking reports on automatic writing, since, obviously, lapses of memory may introduce a wide margin of error in report as to actual lapse of consciousness. With subjects unpractised in introspection this source of error would be very significant. Martin (14) reports a couple of cases in which automatic writing was used in investigation of the subconscious, a method found usable, however, with only two out of nineteen subjects tested. Martin also stresses the importance of drawing conclusions relative to automatic writing from reports of normal subjects, who are trained in introspection.

In connection with a report upon a case of spontaneous *right-hand* mirror-writing, Downey (4) raises several questions as to the validity of certain traditional views with respect to mirror-writing. Spatial reversals of several sorts are found by Stern to be common occurrences in the early drawings and script of right-handed as well as of left-handed children, due, according to Stern's interpretation, to the relative independence of form and position in the development of the child. The fusion of position and form would seem, in part, dependent upon a growth factor, one aspect of which might be a sensitiveness to spatial relationships from the standpoint of practical social orientation. In support of this view the present report shows some evidence of a valid coefficient of inverse correlation between age and ability to read mirror-script. Correlational coefficients point also to a close relationship of ability to read and to write mirror-script and to read and write inverted script. Furthermore, there is some evidence that ability to handle either mirror-reading or mirror-writing is correlated with degree of unidexterity. The traditional view that mirror-writing is the normal writing of the left-handed as left-handed needs revision.

In an attempt to carry further the determination of the relation of form and position in handwriting interpretation, Downey and Anderson (7) found coefficients of correlation for tests on mirror-reading and tests on the reading of samples of illegible writing and tests on the rapid and accurate pairings of handwriting specimens, the so-called Osborn test. The results of the tests, which need standardization, were somewhat inconclusive. Little evidence was found of correlation of ability to read illegible writing and to read mirror-script. The matching of hands proved particularly instructive because of the wide range of individual variation in proficiency and differences in methods of procedure. Matching of written addresses and matching of single words threw into relief curious variations in performance. Dependence upon general impression seems to serve an unpractised reagent more satisfactorily in matching addresses; dependence upon detail-comparison serves him better in matching words. The handwriting experts recommend single word comparisons, but in scoring writing by the scale certain investigators recommend dependence upon general impression.

Thorndike (21) has also used the Osborn test in his investigation of "The Resemblance of Young Twins in Handwriting," in which reagents were asked to match by resemblance each of seventy-two specimens obtained from one of a twin pair with a specimen among the seventy-two obtained from the second member of the twin pair. By such a method it would be possible to derive a scale for unintentional resemblance in specimens of handwriting, a scale which might be utilized in the study of questioned documents.

The general problem of the perception of likeness and difference in handwriting is one of practical importance to the handwriting expert. Downey (5) in a repetition of Hollingworth's experiment failed to confirm his conclusion, the greater consistency with which the likeness judgment was given in comparison with the difference judgment. Attention is called to several factors that complicate the situation and certain modifications of method are suggested.

Osborn (15, 16) recapitulates the causes of error in identification of handwriting. Of particular interest to the psychologist is his analysis of the errors that arise from incompetence in the observer. The most common source of error is the basing of opinions on "general appearance alone." In detection of forgery two important questions arise: To what extent a genuine writing may diverge from a certain type; and how far a skillful forgery may fail to embody characteristics of genuine writing. In court procedure where proof is based upon the presentation of delicate "visible" evidence, such as paper-stains, variations in ink color, erasures, photographs, proper illumination is absolutely essential.

Gommès (10) in summarizing the various lines of graphic research shows the importance of a detailed understanding of the mechanics of the organs of execution (muscles and joints) in connection with handwriting identification. The forger may imitate successfully height, spacing, flourishes—the whole appearance—and fail in the matter of pivotage, the raising of pen, the play of fingers. In addition, particularly for grapho-pathological diagnostic, one must study the function of nervous transmission. Cortical participation in writing as a voluntary act must also be recognized in the form of imaginal and sensation control.

A notable study of the evolution of the automatic writing of children has been made by Wyczoikowska (22), with recognition of five stages of development so distinctive as to make it possible to judge of the child's state of general development by the evolution of its spontaneous writing. In the child's spontaneous writing letters of various ancient and modern languages occur, a fact which points to the existence of a graphical faculty wherein the writing impulse is rooted. An organic basis for cultural writing must be recognized.

The pedagogical interest in handwriting is still centered in the problem of the best methods of scoring. Two tendencies are noticeable: first, the further extension and critical application of the current writing scales and, secondly, an attempt to devise new methods for measurement.

The Ayres (1) scale for measuring the quality of handwriting of children has been utilized in determining a similar scale for adult writing, at request of the New York Municipal Civil Service Commission, with directions as to best methods for scoring samples.

The relation between the Thorndike and Ayres Scales is raised by several investigations. Pintner (17) finds that the Thorndike scale gives more uniform results and is more reliable than the Ayres, due, Pintner thinks, to the fact that it has taken into account other factors besides that of legibility. Most reagents express, however, a preference for the Ayres scale, perhaps because of its convenient form.

Starch (20) in scoring form and speed of writing gives directions for obtaining the latter and measures the former by either the Thorndike or the Ayres scale. He finds that convenience and accuracy of making measurements with either scale are practically the same. Equivalent values are given so that readings on the one scale may be changed into the other. One step on the Thorndike scale is equal to 8.9 on the Ayres. Starch measured the speed and quality of writing for 18 Wisconsin schools and computed a tentative standard score of efficiency for each grade. From these standards the efficiency of a given pupil, grade or school can be estimated very simply. An enormous overlapping in efficiency for the several grades is reported.

Another attempt to establish standards in handwriting for every grade is given in the investigation by Breed and Culp (2) of the writing efficiency in fifteen Michigan schools, as determined by speed and legibility of writing. These investigators question the assumption that the Ayres Scale measures legibility. By actual tests they find the coefficient of correlation between the Ayres Scale values and real legibility values varies from .30 to .38, probable error .06. "Correlation of .79, probable error, .03, and .84, probable error .02, were found between Ayres Scale values and Freeman form values, tending to confirm the view that the Ayres scale measures form rather than legibility." These investigators think that the relation between form and legibility should be determined.

Gray (11) has experimented upon the subjective factor in the use of writing scales. Specifically, he sought to determine the effect of practice upon variability in grading, the practice running through twenty weeks. Some valuable suggestions are given with regard to the technique that should be observed in carrying out this training. With practice in scoring, there resulted greater uniformity among the judges, an outcome with which we are familiar from other investigations on the subjective judgment. A dependence upon general impression in contrast to detail comparison developed with practice, and, also, the acquirement of a general memory of the divisions of the scale. As a practical conclusion Gray urges the need of training a corps of teachers who shall take over the work of scoring handwriting.

In contrast to the stress laid upon dependence upon general impression in scoring writing by the scales, is Gray's (12) insistence upon the value of detailed analysis in diagnosis of difficulties in a specific sample of writing. Gray proposes measuring writing by the score card method as developed by agriculturists. Such a method involves determination of the elements to be measured and evaluation of these points so that the sum of values shall be equal to one hundred. The analysis of handwriting involved in such selection and weighting of graphic elements is valuable in itself and not attempted by the handwriting scales in present use. For practical purposes writing must be graded as a product, not a process, and the number of elements selected for grading must not be unduly large; they should, moreover, be mutually exclusive. The following list was selected: Spacing of letters, spacing of lines, spacing of words, slant, size, alignment, neatness, heaviness, formation of letters. In weighting these elements two methods were used, the Thorndike method and the regression equation. By this means the score card was developed. The score card method of measuring writing will no doubt contribute to analysis of handwriting of school children.

In connection with his valuable résumé of the psychology, physiology, hygiene, and pedagogy of handwriting, Freeman (9) presents a simple method for measuring the main graphic qualities, such as speed, uniformity of slant and of alignment, line-quality, letter-formation, and spacing. As far as possible these measurements are made objectively and there is less dependence upon subjective judgment than is the case in the employment of the current handwriting scales.

An experimental analysis of the graphic movements of adults and children is also furnished by Freeman (8). Measurements of the size, speed and pressure of writing were obtained. Certain psychological factors in the development of the writing process were thrown into prominence by the analysis; for instance, the writing-rhythm, which was found to be more pronounced in the writing of adults than in the writing of children. "The component elements in the process come to be treated not as individual strokes or movements, but rather as stages in the process of the organized whole." The writing of the child is less rhythmical, less organized, and less automatized than that of the adult.

Drawing-scales, as well as writing-scales, are being extended. Rugg (19) reports a scale for measuring free-hand drawing. Childs (3) employed the Thorndike drawing-scale for the purpose of determining (1) growth in ability from grade to grade; (2) standards of ability for each grade; (3) limitations of the scale in actual use, and (4) administrative problems desirable for supervising authorities to know. Among other interesting results, it was found that smoothness of the curve and a marked rise at its end, greater range in gain during the eight years and a smaller range in variation of the product of each grade occurred in the school system with a drawing supervisor. It was found, however, that the average child develops more ability in drawing before entering school than in the entire eight years of his elementary school course. A plateau of non-development from the ages of nine or ten on to adolescence was found and confirmed the reports of earlier studies on children's drawings.

Lutz's (13) series of diagrams by means of which one advances from general outlines to finished pictures would certainly furnish entertainment to the child and would no doubt train him somewhat in selection of form and analysis of objects. A most valuable and detailed account of the aims and methods of teaching drawing is given by Polak and Quilter (18). The training afforded by the work outlined herein would be most profitable.

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READING

BY E. H. CAMERON

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Much of the recent work relating to reading centers around the measurement of reading efficiency. Starch (7) gives a series of graded materials for such tests and presents standard scores in speed and comprehension obtained from over 3500 pupils. Mead (6) made tests on school children showing that they read more rapidly silently than orally and that in general more of the thought can be reproduced by silent reading. Judd (3) found that in general rapid reading and comprehension go together.

One of the best of the more strictly pedagogical books on reading is that of Klapper (4). The author gives a simple and clear exposition of the psychology of reading, and a valuable analysis both of the basic methods and of the more recently evolved specific methods.

Downey (1) presents a report of an interesting case of spontaneous right-hand mirror-writing acquired in childhood, to which the subject tends to revert under certain conditions such as fatigue. Comparison of this person's skill in reading mirror script with that of several other college students revealed great individual differences in respect to this capacity, some of these subjects being superior to the original subject. Downey conjectures that capacity to interpret mirror reversals is dependent on dominant visual as opposed to motor tendencies in mental imagery. It was found that skill with the right hand in mirror writing correlates more highly with ability to read mirror script than does skill with the left hand. In a later study Downey and Anderson (2) found no correlation between ability to decipher and recognize illegible writing and either the pairing of hands or ability to read mirror script. A probable explanation is the relatively greater importance of the meaning factor in the former function.

In view of the relation between the development of language and pictorial representation MacDougall's (5) article is of special interest. An analysis is made of the function of illustration in connection with reading material, and the changing value of the picture in the life of the child and adult, corresponding to that which has already taken place in the race. On the whole there is a surfeit of pictures under conditions of modern society at exactly those points where they are least needed with a consequent loss in intellectual fiber.

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SPECIAL REVIEWS

The "Conscious Cross-Section": A Realistic Psychology. R. C. GIVLER. Department of Printing, University of Washington. 1915. Pp. vi+412.

The author calls his book "a realistic program for psychology," and the interest of it is in the realism as well as in the psychology. The epistemological motive is never in abeyance. The epistemology is in all important points that of Holt in *The Concept of Consciousness.* The data of general psychology are competently outlined, and interpreted as "neutral" facts, of process and of content, which "exist together and arouse impulses in a way that is not found elsewhere" than in this organization of them which is consciousness, an exhibition of the "*with-for*" relation. Perry's "Realistic theory of Independence" and Spaulding's "Defense of Analysis," from *The New Realism*, are laid under important contribution, as well as Holt's book already mentioned.

An introductory announcement of the nature of the undertaking contains the following: "I am convinced that no pussy-foot departures from [the faculty-psychology—"memories of Aristotle, together with the latest popular information about the nerves"] will render adequate service to the matter involved." "Mind is [here] treated as something observable, something mentionable in all of its phases, as well as in its last analysis." "If logical treatment cannot be employed in psychology, we had better not talk of a science of human consciousness."

The book is not, however, a behavioristic psychology. "As I understand it, behaviorism is a theory of the criteria of mind, and not a system that can be substituted for psychology. . . . This book is a realistic program for psychology, and thereby holds that the environment is always to be kept in view along with whatever the organism may be internally or externally accomplishing upon it. . . . The empirical status of mind is the central item of this book, as well as the continual warnings against mysticism and sentimentality in regard to the science of psychology."

Agreeably with Holt's exposition of the nature of deductiveness and of the active functioning of propositions, mathematics is distinguished from the other sciences as the only science purely deductive;

but the deductiveness of it is nothing but functional interdependence among its principles. And it is just such *functional dependence* (which is now to displace the mythological notion of *cause*) that gives genuine deductiveness to the empirical sciences, among which psychology stands at the farthest remove from mathematics. Functional dependence in nature is to be understood to mean "(1) that all natural laws are laws of description and not of necessity, and (2) that those laws are exhibited only when terms are free to be involved in the relations they entail." "Things that stand in a functionally dependent relationship need have nothing in common."

Consciousness is defined as "the objects within responsive range of the nervous system, and the manner in which they are responded to by the nervous system." A science which treats of this matter is statable only in the same way as any other science, namely by the use of terms in relation, relations as well as terms being neither mental nor physical, but "the very tissue of the organization of the cosmos." "The significant differences in the universe are relational, not substantial, and not 'mental,' either." "'Spirit-stuff' is as relational as 'matter,' and when one analyzes even 'souls,' one finds no hidden, mysterious thing there at all."

With the third chapter the systematic analysis of consciousness begins: first of sensations and perceptions, then of responses and meanings, including speech. "This is the program: First to analyse objects from the standpoint of their being sensed, and then to analyse the physiological sensing process. . . . From the first standpoint it will be seen that there are two kinds of properties or attributes which give the sensation its thinghood: essential and inessential. . . . Every one of the essential properties at least will be furthermore seen to be a *series*, and the sensation a cross-section of those terms of each such series which, while the sensing process is going on, are contingent in time and space." The present analysis finds seven "essential" and eleven "inessential" attributes of sensation. "These eighteen attributes are the stuff of which sensation is made." The psychological "stimulus" is the physical "object." The sensation is more: the object and "what it will do."

Motor responses to disordered situations are the matter of Chapter IV, "The Emotional Complex." Such responses are the emotions, instincts, feelings, interest, purpose and the creative faculties. "Their stimuli are objects consisting of series, many of whose terms are missing. Thus mal-adjustment of the organism, and a disordered object are the functional and content sides of emotions and instincts" and their derivatives.

The last chapter, "Matters and Minds," is a "brief but wide study of the ramifications of psychology throughout our practical, daily life." "Objects sensed, objects perceived, objects in an emotional complication—these are the three chief disposals we make of the various series which meet one another to form quotidian things. The various series which get thus concatenated are the ultimate, neutral entities of the universe. When they are considered as being material for responses, they are called matters, and when they are being responded to, and thus united in the with-for relation, they are called minds. In other words, minds are what human bodies do with matters. Matters include minds, but if human beings are to speak in certain ways, the two expressions are required out of convenience and logic."

"That which disturbs our perceptions is the emotional complex, and the first thing to do, if one is to have perceptions of order and motor responses of permanence, is to get rid of all the complexes he can." "The word 'soul' . . . is a word which should be meant to imply a minimum of emotional complexes and a maximum of clear perceptual and motor furtherances." "The permanence of the idea, and its focality in mind is unwavering during the time that the individual is functioning and furthering it. I should call such an idea the source of personality, and I should say also that the mind furthering it was just as permanent as that interest which he was developing was permanent."

The unusual extent of quotation which has been made seems the fairest way to indicate the fertile suggestiveness of this interesting book. And it is thoroughly proficient technically. As for the important controversial matters of epistemology, there is nothing here which pretends to vary in any important way from the doctrine of Holt, which the author calls "the foundation upon which this whole structure has been laid."

The book is sometimes harder reading than it need be. The author carries informality, or non-conformity, of mere diction, so far that he sometimes loses clearness where more accustomed, though less piquant, wording would save it. The wording is often genuinely droll, and would be wholly enjoyable if comprehensibleness were not the first consideration.

For pedagogical purposes, the mechanical arrangement, matters of division and heading, could be improved. For a text-book, the division of almost the entire expository psychological material of the work into two chapters is odd and inconvenient.

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Zur Analyse der Gedächtnistätigkeit und des Vorstellungsverlaufes. G. E. MÜLLER. *Zsch. f. Psychol.*, 1911, *Ergänzungsband* 5, pp. xiv+403; 1913, *Ergänzungsband* 8, pp. viii+567.

These two volumes contain a discussion of the general problems of memory and thinking. The discussion is based largely upon a detailed investigation of a supra-normal memory;[1] but the author also draws upon the results obtained in numerous memorial investigations upon which he has been engaged since 1887, and he cites from the findings of other investigators in this field.

The first volume opens with a consideration of types of sense-memory, and here the author presents a description of motor learning, visual learning, and learning by the blind; this section also discusses the circumstance that the procedure which an individual employs in any given act of learning, and in his subsequent recall, is determined by a multiplicity of factors. Among the factors which the author describes here are the individual endowment of the learner, the mode of presentation of the material, the rapidity of presentation, the characteristics of the material itself, the length of interval between learning and recall, fatigue and distractions. Then follows a discussion of the introspective method as employed in the investigation of memory and thinking. The author makes a sharp distinction between genuine and alleged introspection, that is, between the retrospective description of a mental process which has just completed its course, and the reminiscent or "anecdotal" method which has sometimes been appealed to as a substitute for the genuine introspective method. In consequence of his experience of nearly thirty years Müller concludes that retrospective description under controlled conditions does not differ essentially, either as to mental processes involved or as to trustworthiness, from the method of objective description as practiced in the physical sciences. He formulates a set of rules for guidance in introspecting, and appends a discussion of the controlling of the introspective method. In another section the author describes the methods employed and the results obtained in his investigation of Rückle's processes of learning and recalling. The materials employed were usually lists of numbers; but lists of consonants, Roman numerals, nonsense-syllables, poetry, geometrical figures and colors were presented in certain experiments. These materials were presented in a variety of ways; and the learning-effect was tested by a number of traditional methods. The results of these experiments enable the author to compare Rückle's memorial efficiency with that of other "prodigies," and to compare his learning of numbers with his learning of other materials; they also throw light upon Rückle's learning type, his employment of the principle of grouping the materials to be learned, and his use of memorial aids. It turns out that Rückle is dominantly visual but that he frequently has recourse to auditory-motor imagery; he differs from other "prodigies" not only in the fact that his memory of numbers is very much superior to theirs, but also in the fact that he possesses a supra-normal memory for other than numerical materials, and his general intellectual endowment is of a much higher order. His remarkable achievements are due in the main to an unusual capacity to concentrate his attention and to apprehend materials with extraordinary rapidity; his associations are exceedingly tenacious and his perseverations are almost negligible. Experience has taught him to adopt an economical procedure in learning; he always seeks to group his materials as advantageously as possible, and to seize upon such interrelations as obtain between the different parts of the material; his knowledge of mathematics and his remarkable memory for numbers enable him to discover relationships which escape the notice of the ordinary learner.

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[1] Dr. Rückle was a student in mathematics at the University of Göttingen. He displayed remarkable skill in memorizing numbers and in calculating mentally; the feats which he is able to perform are much more marvelous than those of any other 'mathematical prodigy' who has ever been investigated. In addition to this Dr. Rückle has been a serious student of higher mathematics, and his doctorate thesis has been commended by mathematicians. Reports of Rückle's memory have already been published elsewhere from time to time; see this BULLETIN, 1913, 10, p. 337.

Müller's third volume is devoted to a consideration of certain of the more general problems of remembering and thinking. Among the most valuable portions of this volume, in the opinion of the reviewer, are the description of the component processes and the consecutive stages of the act of learning, and the discussion of the factors which contribute to subjective certainty in recall. An extensive consideration of *determinierende Tendenzen*, *Bewusstseinslagen*, *Bewusstheiten* and *Wissen* convinces the author that all of these phenomena can most readily be explained without having recourse to the hypotheses which have recently been brought forward by the Würzburg group. Perhaps the most ingenious and valuable part of the treatise is the discussion of indistinct imagery. Here the author advocates the view that this characteristic of indefiniteness is to be regarded not as a defect but rather as an advantage, in many instances at least; the indefinite image is capable of more facile functioning, and in consequence of this advantage it serves a useful purpose in the economy of mind. The errors into which Ach, Binet, Watt and others have fallen are due to their failure to realize the presence and significance of indefinite imagery. Müller has repeated a number of those experiments whose results are alleged to support the doctrine of imageless thought, but his findings and his conclusions are completely at variance with those of the Würzburg group. He cites numerous introspections from the published papers of these writers and shows that there is no warrant for the interpretation which their authors have put upon them. Müller appends the caustic remark: "When one is unable to furnish any detailed information regarding a mental phenomenon one simply declares that it is a *Bewusstheit.* Of course, if this is what we mean by *Bewusstheiten* there is no lack of evidence that *Bewusstheiten* exist."

Müller's book is an exceedingly valuable contribution to the literature of psychology. Its author is undoubtedly the world's most experienced investigator in his field; and his systematic summary of the results and conclusions which he has reached in his thirty years of experimentation is sure to find a permanent place in the literature. His presentation is marred at times by an unfortunate tendency toward prolixity of statement; it is to be regretted, too, that the three volumes of the series were not published in consecutive order,[2] and that no index is supplied. The author shows a praiseworthy tendency throughout to base his discussions upon experimental findings; and his conclusions are conservative and well-founded. In these days when the literature of learning and thinking is encumbered by so many dilettante investigations and so many ill-founded speculations, it is refreshing to find a work that is dominantly empirical and conservative throughout. Müller's presentation of certain aspects of the psychology of learning is the best that has yet appeared; and his discussion of the psychology of thinking will undoubtedly contribute to a clearing up of the problems in this field.

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[2] The first volume (Sections 1–47) was published in 1911; the third volume (Sections 99–130) was published in 1913. The second volume (sections 48–98) has not yet appeared.

NOTES AND NEWS

The August number of the Bulletin, dealing with comparative psychology, has been prepared under the editorial direction of Professor W. S. Hunter, of the University of Texas.

Professor W. S. Hunter, of the University of Texas, has been appointed professor of psychology in the University of Kansas.

Professor L. R. Geissler, of the University of Georgia, has been appointed assistant professor of psychology and education in Clark College.

Dr. A. S. Edwards, of the University of Minnesota, has been appointed professor of psychology and education at the University of Georgia, to succeed Professor Geissler.

Dr. Elizabeth L. Woods has been promoted to assistant professor of psychology at Vassar College.

The following item has been taken from the press:

A psychological laboratory has recently been established at Bellevue Hospital under the direction of Dr. M. S. Gregory, the resident alienist. Research will be conducted by Dr. Leta S. Hollingworth, formerly psychologist in the Department of Public Charities in New York City.

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GENERAL REVIEWS AND SUMMARIES

SEX DIFFERENCES IN MENTAL TRAITS

BY LETA S. HOLLINGWORTH

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Since the very complete and painstaking review of the literature of sex differences which appeared in the BULLETIN in October, 1914 (11), there have been few studies undertaken with the chief aim of investigating sex differences in mental traits. Such results as have been published in the last two years are derived chiefly as incidental matter from studies prosecuted with some other main problem in view. In this field, as in other scientific fields, little has come from abroad. The few articles and monographs which have appeared in Europe under titles which would imply that they contain data on sex differences have not been accessible to the present reviewer, and it is doubtful if they are at all accessible in this country.

Researches undertaken for the purpose of obtaining developmental norms have yielded interesting data on sex differences. In the standardization of their Point Scale for measuring intelligence, Yerkes and Bridges (14) report that in their English-speaking groups girls attain higher scores than boys between the ages of five and seven; that they then tend to fall below the averages for the boys, with minor variations up to the age of eleven, when they again for a year or two surpass the boys, only to drop below once more from fourteen onward. The authors interpret this crossing and recrossing of the curves of the sexes to be a revelation of actual and reliable sex differences. As a result of their research they are "fully convinced that the accurate determination of norms for the sexes is eminently desirable," and they "suspect that at certain ages serious injustice will be done to individuals by evaluating their scores in the light of norms which do not take account of sex differences."

Terman (9) in his experiments with 1,000 unselected children, in revising the Binet-Simon Intelligence Scale, finds a small but fairly constant superiority of the girls up to the age of thirteen years. At fourteen years the curve for the girls drops below that for the boys. The apparent superiority of boys at the age of fourteen years is, however, fully accounted for by the more frequent elimination of fourteen-year-old girls from the grades by promotion to the high school. "The superiority of girls over boys is so slight that for practical purposes it would seem negligible." Terman offers "no support to the opinion expressed by Yerkes and Bridges that 'at certain ages serious injustice will be done individuals by evaluating their scores in the light of norms which do not take account of sex differences.'" Apart from the very slight superiority of girls, Terman finds the distribution of intelligence in the two sexes to be the same. The supposed greater variability of boys is not found. "Girls do not group themselves around the median more closely than do boys."

Terman suggests that the fact that so few women have attained eminence "may be due to wholly extraneous factors," the most important of which are (1) that the occupations in which it is possible to achieve eminence are for the most part only now beginning to open their doors to women, homemaking, the traditional occupation of women, being a field in which eminence is impossible; (2) that even of the small number of women who embark upon a professional career, a majority marry and devote a large amount of their time and energy to perpetuating the species; (3) that both the training given to girls and the atmosphere in which they grow up are unfavorable to the inculcation of the professional point of view. The author also notes the possibility that the affective traits of women may be such as to favor the development of sentiment at the expense of intellectual ability.

Trabue (10) in standardizing his Completion Test Language Scales finds that on the whole boys make a somewhat lower median score than girls in the same grade, although the difference is small, and the amount of overlapping is enormous. His figures for 1,590 boys and 883 girls show that according to the quartiles there is no sex difference in variability.

Woolley and Fisher (12) report in full, in monograph form, their mental and physical measurements of working children in Cincinnati. The children were tested at fourteen years when they came to the work-certificate office to obtain certificates, and again, one year later. The physical tests applied were of height, weight, visual acuity, auditory acuity, vital capacity, steadiness of hand, strength of hand, rapidity of movement, and accuracy of movement. The mental tests included cancellation, memory, substitution, completion of sentences, association by opposites, and the puzzle-box test. Except for height at fifteen years, in which the two sexes are about the same, the girls excel the boys in height, weight, steadiness, and card-sorting, while the boys excel in strength, rapidity of movement and vital capacity. Boys excel in performances where strength is the chief factor, and girls in those where coordination and a fine control of muscles is most prominent. In the mental tests the only large sex difference in the entire series is that of the great superiority of the boys in the opening of the puzzle box. The authors feel that this test is unfairly selected on the ground of sex, as boys are more encouraged to take an active interest in mechanical construction, and accordingly understand more about how many things are made, and what the simple mechanical devices are. This would give the boys an unfair advantage on the ground of training, just as tying a bow-knot (in which Terman found girls superior to boys) would give an unfair advantage to girls.

In the preparation of a scale for the measurement of fourteen- and fifteen-year-old adolescents, Woolley (13) reports with respect to variability, that "if variability is measured by the difference between the five and ninety-five percentiles, the differences between the two sexes are small and not entirely consistent. In the physical tests the boys are a trifle more variable at fourteen, and decidedly so at fifteen. In the mental tests the boys are a little more variable at fourteen, while there is a somewhat greater difference in favor of the girls at fifteen." One fact with regard to variability holds for all series. The girls show a wider variation below the median than above it. The research covers 750 fourteen-year-olds and 680 of the same children at fifteen years of age, all being school children who were dropping out of school to go to work.

E. K. Strong, Jr. (8), publishes the results of an experiment with fragments of advertisements. Strong first exposed the advertisements to the subjects (forty women students, and a group of forty men composed of college students, instructors and professors) at the rate of one per second. When fragments of the original advertisements were studied by these subjects, the women remembered 51 per cent. more details than did the men. The investigator then allowed the subjects to inspect another series at their leisure, giving unlimited time to look over the material. Under these conditions the women remembered 53 per cent. more details than did the men. Strong concludes that a genuine sex difference is disclosed in this experiment, but does not attempt to determine whether the difference is due to inherent capacities or to differences in training. He ascribes the more pronounced emotional response of women to advertisements, which he noted in a previous study, to their superior ability to note detail.

Among the investigations which have been undertaken for the explicit purpose of studying sex differences is Boring's experiment on capacity to report on moving pictures. Boring (1) experimented with both children and adults of both sexes, in order to make comparisons of the reliability of testimony as conditioned by sex and age. Forty-four subjects were used: thirteen women, the majority of them being undergraduates in Cornell University; eleven men, the majority of whom were graduate students of psychology or professors of psychology; twelve boys and eight girls, taken from a single class in the Ithaca public schools, and having an average age of 12.3 years.

A scene from a photo-play was presented. The subjects were not told what the purpose of the experiment was, but those who were students or professors of psychology suspected from the conditions and instructions that the test was to be one of ability to report. The traits scored were (1) range of report, (2) spontaneity of report, (3) range of knowledge, (4) accuracy of report, (5) assurance, (6) reliability of assurance, (7) warranted assurance, (8) assured accuracy, (9) tendency to oath, (10) warranted tendency to oath, (11) unwarranted tendency to oath, (12) reliability of oath.

The author concludes from the results of his experiment that "There is evidence that the boys exceed the girls in range of report, in tendency to oath, and also in unwarranted tendency to oath, and that the girls exceed the boys in reliability of oath. The significance of none of these coefficients is very high, although the last is undoubtedly reliable. With men and women the differences are more marked. The greatest difference occurs in the unwarranted tendency to oath, in which the women exceed the men. The men exceed the women in range of report, range of knowledge, assurance, warranted assurance, assured accuracy, and reliability of oath."

"It appears, then, that there is little difference apparent, with the material used, between boys and girls, whereas there is quite a marked superiority of the men over the women with respect to six (perhaps seven) coefficients. This conclusion accords with the general psychological principle that even those mental sex differences which are large in adults are relatively slight in childhood." The author notes the fact that there is a source of error in the circumstance that the group of women was otherwise constituted than was the group of men. He nevertheless accepts the difference which he finds between the men and the women as a sex difference, although it coincides with what would be expected *a priori* from differences in age, training and preliminary knowledge of the experiment, quite apart from sex. In the group of children, where none of these factors was present, no reliable sex differences were found, except that the girls showed much greater caution in taking oath than did boys.

Gates (3) reports tests on a large number of school children of both sexes, conducted with the purpose of determining variations in diurnal efficiency. He finds no sex difference in the variations of diurnal efficiency; the records of both sexes may be combined in platting the course of the daily rhythm. The correlations of the various tests with each other also failed to reveal any sex difference. The average scores of boys and girls when compared revealed the following sex differences: "(1) In addition and multiplication the girls appear to be somewhat superior, although such is not invariably the case. (2) In the drawing test the girls appear to follow the method of emphasizing accuracy rather than speed, and the boys speed rather than accuracy. That one sex is actually capable of excelling the other in either speed or accuracy cannot be said with certainty. . . . With respect to accuracy, there is a small amount of evidence favoring the superiority of boys. (3) In the completion test the girls show a distinct superiority. (4) The girls are decidedly more efficient in cancellation. . . . (5) The girls excel without exception in money for auditory and visual digits, and in recognition of nonsense syllables. (6) Excluding the tests for speed and accuracy of movement, in which results, as far as ability is concerned, are uncertain, out of forty-two comparisons (six classes in seven tests) the girls excel in thirty-eight, and the boys in four."

Gates (4) also reports tests on 197 students of elementary psychology, for memory of visual and auditory digits, memory of verbal sense material, recognition of geometrical forms, and learning in a substitution test. The separate correlations for the sexes are very similar. The results of the memory tests are "in harmony with the generally accepted belief that women excel in this kind of work." The men excel slightly in the substitution test, but the difference is not great.

L. S. Hollingworth (5) presents a series of tests on twenty-five subjects to determine whether any relation can be established between the mental and motor efficiency of women and the catamenial period. Twenty-three women were subjected to the tests, and two men were tested at the same time as controls. The traits tested were speed and accuracy of perception, controlled association, speed of voluntary movement, steadiness, rate of learning and muscular fatiguability. The results of the experiment are negative. No influence of menstruation upon the processes tested can be demonstrated from the data thus collected.

Pittinger (7) has made a study of the choices of occupation, the scholarship, etc., of high-school graduates in five north central states. Fewer females than males undertake courses of advanced training. Variety of training or employment is less among females than among males. Various differences in occupations selected are indicated. The most scholarly of both sexes go on to take advanced training.

Jastrow (6) has added to the general discussion of sex differences in his chapter on the psychology of group traits. He has made no systematic attempt to cite sources of authority or data. Many of the traditional views about sex differences, which were advanced before experimental data were sought, are rehearsed. The author points out that "men and women are organically different," from which he derives the conclusion that a contrasted psychology is involved. Pathology is appealed to as furnishing valuable clues to innate sex differences. For instance, "Among the typically masculine insanities is general paralysis. Its early stages parallel the symptoms of alcoholic intoxication: tremor of speech and movement; coarseness of expression; uncertainty of sensory action; and free indulgence of expansive thought. It develops quickly to the later stages with paralytic symptoms, illusions of grandeur, loss of control, and a generally disordered excessive functioning—throughout a picture of exaggerated masculine psychology." The author seems here to imply that the greater frequency of general paralysis in men is a clue to the existence of some innate sex difference in neural functioning. In such instances the appeal to pathology fails, as the etiological factor in general paralysis of the insane is not psychological but organic. It occurs more frequently among men because syphilis occurs more frequently among them.

Brown (2) and his co-workers have carried out a series of careful experiments to investigate individual and sex differences in suggestibility. As the experiments were numerous and the technique detailed, no brief summary can be successfully presented. Those who wish to consult the data in detail must be referred to the original monograph. Brown concludes that "a general review of the entire series of twenty-six experiments reveals a very distinct difference between the sexes. In thirteen of the experiments there is a clear difference between the sexes, and in only one of these experiments are the men more suggestible. There are only four experiments in which no sex difference can be made out. . . . The difference between the sexes is more distinct in some of the groups of experiments than in other groups. There can be little doubt that women are more suggestible in tests which involve an imagined sensation, a series of progressive changes, distortion of memory, and estimation of magnitude. The tests with illusion do not give clear differences between the sexes, and the tests with aesthetic judgments give contradictory or indecisive results."

Two considerations have especially impressed the reviewer in going over these recent contributions to the literature of sex differences. The first has to do with method. Investigators seem to have acquired the habit of dividing their subjects automatically into two groups on the basis of sex. Thereupon they proceed to describe all differences found between the two groups as sex differences. As a matter of fact, differences thus found should logically be treated only as group differences, unless the author is able to show that the group of males differs more from the group of females than from other groups of males similarly selected. In general, the investigators here reviewed have not covered this technical point.

The second consideration has to do with the results bearing on the question of the comparative variability of the sexes. Terman, Trabue, and Woolley present variability figures on hundreds of boys and girls with the uniform result that neither sex is found to be more variable than the other. This is in accord with the result derived from the researches of Courtis and Goddard, previously reviewed in the Bulletin. More extensive and reliable data have been made available on this point in the last five years than in all time preceding.

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CHARACTER AND TEMPERAMENT

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The technical literature on character and temperament is as scarce as the more popularized discussions of the subject are numerous. Among scientific investigators in this field we note Davenport (5) who has made a study of the inheritance characteristics of violent temper. The fact that the tendency usually does not skip a generation indicates that it is not sex-linked and that it is a dominant. That it is not a simple absence of a mono-hybrid element is proved by the appearance of well-controlled children in the progeny of the two parents who show the outbreaks. It seems probable consequently that violent temper is due to a simple, single, positive determiner which prevents the action of the inhibitor that normally keeps the emotions under control. The best single rough criterion of a simple dominant trait is the reappearance of the trait in each generation in some of the children of an affected person. This criterion is most strikingly fulfilled by the trait that we are considering. It follows, according to Davenport, that since the tendency to violent temper does not skip generations, unaffected members of a fraternity who select an emotionally controlled consort, will only exceptionally, if ever, have affected offspring.

Burr (3) has made a study of the characteristics of misers and notes their lack of the social sense, the self-centeredness and their absence of the need of companionship. Need of money rarely, if ever, acts as an exciting cause in starting from necessity what later becomes a fixed habit. Miserliness is not an obsession, because the obsessed are affected against their wills, fight the obsession and are made unhappy, while misers enjoy. Miserliness differs of course from the true insanity in which there are delusions of poverty and the patient thinks he has not the wherewithal to get his bread.

Gowin (8) has made an interesting study of the height and weight of executives as compared with the averages of policy-holders. The executives are in general considerably taller and heavier than the intellectuals. Another very interesting tabulation is the comparison, as to weight and height, of executives of smaller importance and executives of larger responsibility. This list shows that, in both height and weight, the bishops exceed preachers in small towns, university presidents exceed presidents of small colleges, presidents of state bar exceed county attorneys, sales managers exceed salesmen and railroad presidents exceed station agents. Among the characteristics that make for executive ability the author mentions as particularly important physical prowess, a heritage from the dominance of brute strength among primitive men, which has by no means lost its effectiveness in modern society. Another factor is emotional control. The man of superior physique has more emotional reserve than the thin man and consequently the former exceeds in emotional control such as is required in executive work.

Jastrow (9) has written perhaps the most extensive systematic treatise on character and temperament. Kerschensteiner (10) distinguishes four fundamental aspects of character. The strength of the activities of life are due to the native volitional traits, the cognitive functions give to action its particular direction, sensitivity for social values gives multiplicity of responses from which to select appropriate ones, and the perseverance tendency gives to action its consistent continuity. These four fundamentals of character should, according to Kerschensteiner, be developed by sufficient freedom in the schools to call for their exercise and development to the point of habitual attitudes. Drake (7) in a recent text on ethics distinguishes between the character of motives and character as determined by fulfilled motives in action. The latter is of course the socially significant essence of character and it is contrasted with Kant's conception of the will as purely passive and ideal.

Prince (12) interprets the Kaiser as suffering from a mild form of paranoia. The systematized delusion is in his case fear of the loss of his prerogatives as autocratic ruler of Prussia. The Kaiser's obsession is diagnosed as a subconscious phobia, a fear of democracy for himself and his house. Putnam (13) emphasizes in a popularly written book the influence of forgotten emotional experiences in moulding temperament. He suggests the Freudian psychoanalytic method for unearthing these experiences and diverting the tendencies resulting from them into socially more acceptable traits. Dearborn (6) in a small volume emphasizes the causal relationship between joy and the effective performance of the bodily functions. Its influence on temperament is explained by showing that the attitude of contentment is subject to all the laws of habit formation. Hence this factor in moulding temperament is under conscious control. Whitney (14) investigated the relationship between deportment and religious training, between deportment and home training, and between scholarship and deportment. This investigator made use of the records of about six hundred boys and six hundred girls. High correlations were found in all three of these relationships. High mentality does not necessarily correlate with good conduct, but low mentality is highly correlated with poor conduct. Whitney's conclusions are directed toward the establishment of definite instruction in ethics in the public schools. Montmorency (11) defines patriotism as a form of personality. While it is also defined as loyalty to an ideal, the possession of this trait is closely related to that of corporate spirit which is a character trait. Cody (4) considers, among other aspects of his subject, also the applied psychology of merchandising, correspondence, personal salesmanship, and advertising. He presents at some length the practical pointers derived through experience. A considerable amount of this material constitutes good psychology although it contains little, if any, systematic work. Armstrong-Jones (1) writes on the relation of genius to insanity, pointing out that genius often goes with deficient morality. This again calls attention to the fact that there is apparently a low correlation between the extreme imaginative and associative development of genius, and the highest attainments of character development. However, Webb reports a fairly high correlation between character and intelligence for an average group of students. This shows that the correlation which is fairly high for an average group of subjects breaks down when the comparison is limited to a group selected from the extreme of either scale. However, it must be borne in mind that genius is not at all synonymous with the positive extreme of the intelligence scale.

Mrs. Blackford (2) attempts to show that the physical features of face and the general characteristics of one's bodily constitution are adequate criteria for vocational guidance. She uses such criteria as convexity and concavity of profile, fine texture and coarse texture of complexion, etc. The most serious objection against her work is that she has no statistical evidence for her assertions. If a relationship exists between certain temperamental characteristics and relative coarseness of complexion, or with concavity and convexity of profile, such a relationship should be established by correlating quantified measurements on a thousand or more cases with impartial estimates of character traits. Then, and only then, would she be justified in asserting the practical reliability of such criteria in vocational guidance. That argument against Mrs. Blackford's work which is based on the theoretically assumed impossibility of her assertions is not a valid one. If quantified estimates of character traits could be shown to have a high correlation with the physical measurements of which she makes use, then her method would have its final practical justification, whether or not it satisfied theorizing on the subject. Until such a quantitative study appears, psychological opinion about her work will be negative or at least skeptical.

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COMPARATIVE PSYCHOLOGY OF RACES

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We are at last beginning to get comparative mental measurements of the white and colored elements in the population of the United States. A few series of such measurements were noticed in a previous number of the Bulletin devoted to race and kindred topics (Oct. 15, 1914), and more have since appeared.

Phillips having previously observed that the school retardation was much greater in Philadelphia schools for colored children than in those for white, now (13) applies the Binet tests to groups of white and colored children whose homes were also visited, and equates the environmental factor by pairing each colored boy with a white boy of approximately the same age and home conditions, and girls similarly. The colored group tested on the average .83 years below their chronological age in the case of the boys, and .59 years below in the case of the girls, whereas the white boys averaged .16 years above and the white girls .19 years above. The difference between the white and colored children was thus .99 years (Binet units) with boys, and .78 years with girls. Of the colored children, 68 per cent. got a Binet rating below their chronological age, and of the white children only 43 per cent. Of a larger unselected group of 86 colored and 166 white children, from which the above-mentioned comparable groups were selected, 55 per cent. of the colored ranked a year or more behind their chronological age, and 7 per cent. a year or more ahead; while of the white children 24 per cent. ranked a year or more behind and 20 per cent. a year or more ahead. The author also reports incidental observations—without statistical evidence—to the effect that "the colored pupils as a class were good in the memory tests and poor in those requiring judgment. They were generally slower in response. The testing of the colored children took a much longer time than the white. Their reaction time was greater, they were less animated."

A comparative study of the amount of "retardation" in grade of white and negro pupils is reported by Perring (12) from a Philadelphia school in which about a third of the pupils were negroes taught in classes along with the white children. A considerably larger proportion of the colored than of the white pupils were found to be retarded, the percentages being: for white boys 34; for white girls, 29; for negro boys, 57; for negro girls, 59. This difference between the races was more pronounced in the lower than in the upper grades, perhaps because of differences in the factor of elimination. The average degree of retardation, measured in years, was greater for the retarded negro than for the retarded white children. There were also fewer cases of acceleration among the negro than among the white children. This relative lagging of the negro in school was not due to an excess of physical defects, for the medical inspector's record showed, curiously enough, that physical defects were more common among the white than among the negro children.

Pyle has made extensive and comparative tests of negro and white children, ages eight to sixteen, and published two brief notes (14, 16) and a somewhat fuller report (15). The negro children were pupils in the schools of three towns in Missouri. In general, the negro children scored less than the whites in the tests. The girls did better than the boys in both races, and in fact the negro girls surpassed the negro boys more than the white girls surpassed the white boys. The racial differences in the different tests varied considerably, thus in the average of both girls and boys the colored children scored in relation to the whites of the same ages the following percentages: in cancellation tests, 99; in a free association test calling for speed in continued association, 83; in logical memory, 82; in rote memory, 73; in word building, 47; in substitution tests, 46; in controlled association (average of tests for opposites, genus-species, and part-whole), 41.

Pyle's curves show that the difference between the negroes and whites tested becomes somewhat less with advancing age, as appears also in the following condensation of his data. In the average of both sexes negro children of 8 to 10 scored 50 per cent. as much as whites of the same age; negro children of 11 to 13, 59 per cent.; and negro children of 14 to 16, 73 per cent.

Pyle separated the negroes into two groups according to their social positions and found that those of the upper social class stood about midway between the whites and the poor negro group. This difference was most marked in tests for learning, association, memory and constructive imagination. The author suggests that the negroes composing the upper social class may have more white blood than the others. At all ages the boys of the two races were about equal in muscular strength and speed; and the same is true for the younger girls; negro girls surpassed white girls in strength above the age of ten, whereas white girls surpassed in speed.

In a later series of tests with a special apparatus calling for motor coördination and association the results indicated that "negro children have three fourths to four fifths the learning capacity of white children," whereas in the former series the general result gave them about two thirds of the score of the whites. The author believes that the factor of experience and environment is largely eliminated in the later tests.

Ferguson has published a full report (**6**) of some tests of white and negro children in the schools of Richmond, Fredericksburg and Newport News, Va., along with a discussion of the literature. The subjects were principally from the ages of 11 to 18 and were in both primary and secondary schools. Since the proportion of colored children attending school is somewhat smaller than that of the whites, and considerably smaller in case of the high school, the probability is that negro subjects represented a somewhat more selected class than the whites, especially in the upper grades. In all 486 whites and 421 colored pupils were tested with the analogy or mixed relation test, the Trabue form of the completion test, a cancellation test and a maze or steadiness test. When the white children are compared with all colored children taken together the white make a considerably better score in the mixed relation and completion tests, though this difference becomes less in the high-school grades. Taking all groups together the colored children scored 75 to 80 per cent. of the whites in the mixed relation test and completion tests, while in the cancellation or maze tests there was no clear difference between the races. In the maze test the colored pupils worked more slowly and more accurately, whereas in the cancellation test they worked more rapidly and less accurately, but these minor differences are perhaps not significant, the general effect being that of equality between the races in these two tests. In the more intellectual tests mentioned the relative score of the negroes as compared with whites was considerably better in the upper grades and occasionally goes above par. Expressed in terms of the percentage of the colored subjects reaching or exceeding the average of the whites, we find, for example, in the mixed relation test: for Grade 5 about 20; for Grade 6, 25; for Grade 7, 14; for first year high school, 48; second, 28; third, 88; and fourth 54. In the completion test negroes do not stand as well as in the mixed relations test.

The author, being accustomed to negroes, classified his subjects into full blooded, three quarters, mulatto and quadroon on the basis of color, hair and features, and while he admits a certain margin of error in this classification, believes that it was fairly accurate. He is thus enabled to compare the standing of the full bloods and mixed bloods, and reaches the clear result that, in the more intellectual tests, success increased with the proportion of white blood. Thus in the mixed relations test the full-blooded negroes scored about 64 per cent. as much as the whites; the three-fourths negroes, 70 per cent.; the mulattos 82 per cent. and the quadroons (of whom, however, there were only a few) 96 per cent. He also found that the proportion of light-colored negroes increased from 46 per cent. in the elementary school to 59 per cent. in the high school. This indicates "that the schools select colored persons of partly white lineage to a greater extent than they select negroes, and as the grades advance the selection becomes more pronounced. This would imply that mulattoes in general are of greater ability and ambition than are pure negroes."

As regards variability, the author reaches the probable conclusion that pure negroes vary less than whites and mulattos about the same as whites; that when all colored subjects are taken together they vary more than the whites. In a concluding discussion the author suggests that the tests and school records indicate that the negro is not on an equality with the white in regard to scholastic attainment. Following the line taken by Galton in estimating the eminence of different races and assuming that negroes average 75 per cent. of white ability, the mulattoes 87.5 per cent., he computes that there should be six mulattoes and two negroes in the United States of the degree of eminence reached by 4,464 whites.

Martin (9) reports briefly on an attempt to adapt the Binet tests to the Zulu language and conditions, finding that some tests can and others cannot be readily adapted. The children under eight years who were tested came out "at age" or within a year of age, while older children tended to fall below age, either because the tests were ill-adapted to those above the age of eight, or else because Zulu adults do not show as good relative ability as Zulu children. At all ages there was a great deal of difficulty in the test calling for comparison of weights.

Atlanta University has published a collection of several papers, reprinted from different sources, by Mall, Boas, Thomas, Chamberlin and others bearing upon the question of negro intelligence.

Stigler's work (19) on racial differences, though physiological rather than psychological, deserves mention here. Though the European is able to endure tropical life, provided he avoids malaria and other tropical diseases, he is not, as a rule, able to perform heavy labor safely. He is much more subject to heat prostration. The author seeks the cause of this racial difference. He brings together previous evidence regarding the value of the skin pigmentation of tropical peoples, with the result that pigmentation is not a protection against overheating, but only against the chemical effects of the actinic rays. The temporary pigmentation of the white man's skin exposed to sunlight, together with clothing, enables him to withstand the direct effect of tropical radiation. The real difficulty for the white man in the tropics occurs in the process of removal of heat from the body, especially the excess of heat produced in muscular activity. By experiments on (unfortunately very few) white and negro subjects performing very active exercise in overheated rooms, the author found the negro's temperature to rise somewhat less on the whole in doing a certain quantity of work, and to return more quickly to normal after the work ceased. The mechanism by which the negro accomplished his superior regulation was not clearly made out. It could not be by more abundant perspiration, since both white and negro produced an excess of sweat, *i. e.*, so much that much of it dropped from the skin before it could evaporate and cool the skin. Some evidence, not wholly satisfactory, is cited to the effect that the blood vessels are more developed in the negro's than in the white skin; this, if true, would permit of more heat elimination by radiation and conduction. No doubt the negro's superior heat regulation is partly a native and partly an acquired trait, though it is not yet clear exactly how the effect of training comes in. The author suggests that possibly the cutaneous vasodilation after exercise is more prolonged in the case of the negro.

The book by Du Bois (4) though having little to say about the psychology of the negro is interesting because written from the negro's standpoint. It endeavors to summarize what is known regarding the history of Africa, of the slave trade and of the negroes in America both before and after enfranchisement, and to point out the achievements of the negro race as well as the difficulties with which it has to contend.

A comparison of white and Indian children by the Binet tests has been made by Rowe (18). The Indian children (mostly from 10 to 19 years old) were pupils in the U. S. Government School at Mt. Pleasant, Michigan, and the white children (mostly from five to eleven years old) were in the schools of the same town. The Indian children showed more retardation of the mental as compared with the chronological age than white children. The weakness of the Indian children seemed especially marked in tests involving comparison and definition, though these differences between the different tests were not very marked, the Indians being everywhere inferior to the whites. It should be said, however, that the Indian children tested were on the whole very much older than the white children and therefore not only likely to show more retardation in years but also, according to all experience, somewhat less susceptible to fair examination by the Binet tests. When a comparison is made between whites and Indians of the same chronological ages (ages 10 and 11 being the only ones available), however, there is still evident considerable superiority of the whites.

The book of Gobineau (7), published in 1853, now translated, advances the general thesis that different races and stocks are naturally unequal in strength and ability and that they are uneffected by environmental conditions. The decline in civilization that appears from time to time in one or another country does not mean a decline in the strength of certain stock, but the disappearance of that stock through death or dilution with weaker stock.

Jordan (8) gives three causes that can permanently lower the force of a race: First, emigration of its stronger stock; second, immigration of inferior stock; or third, war killing off the more virile strains. Race mixture, which is often supposed to give an inferior product, does so only because the mixture commonly occurs between inferior parts of the two races. When, however, good blood from each race unites we have no evidence that the hybrid is inferior to the parent stocks. "The intermarriage of European races can hardly be called crossing at all as the racial differences concerned are of slight order, little more than temperamental at the best, and most of the traits we commonly recognize are matters of education. All those qualities which disappear in a generation in America must be chargeable to education, not to race. And, in general, other things being equal, the advantage seems to be on the side of the blended races which belong to the same general stock. Moreover, in civilized lands there are only blended races." Apparently the mulatto in America as a whole is superior to the pure negro from Africa; but the black stock is inferior to the white. "The claim is sometimes made on an assumed basis of science that all races of men are biologically equal, and that the differences of capacity which appear are due to opportunity and to education. But opportunity has come to no race as a gift. . . . Powerful strains make their own opportunity. The progress of each race has depended on its own inherent qualities. . . . Physical surroundings have played only a minor part. . . . In general, the highest range of possibilities in every field has been reached by the blonde races of Europe. Groups of less individual or of less aggregate achievement may properly be regarded as lower." It should be said that the evidence for these statements is not given in the article.

Diggs (3) is of the opinion that race is responsible for a large share of the differences between nations in such matters as language, literature, institutions, industry and religion, all these being dependent upon what he calls "mental set of a people" which in turn is dependent upon its physical constitution.

Parsons (11) gives reasons for doubting the customary assertion of civilized man that he owes his civilization to far-sightedness in contrast with the improvidence of primitive peoples. She describes the preparations made for a rain dance of the Zuñi as evidence of a long series of activities designed for a future end and involving present self-denial. Even among still more primitive tribes ceremony and magic are present, and these always mean forethought and self-denial. The difference between modern and primitive man or rather between modern and primitive culture is in the direction taken by human providence.

Recent discussions of national differences have been influenced by the war and are, on the whole, even less worthy of the psychologist's attention than usual. An exception should be made in favor of the works by Veblen and Dewey, which are thoroughly dispassionate. Veblen (20) shows that racially Russia, Scandinavia, Germany, the Low Countries and England differ only to a very slight degree, all the races of Europe being composed of the same elements, though the darker element preponderates more towards the south and the blonde element towards the north. The differences are very slight on the east and west lines. He endeavors to reconstruct for the reader the prehistoric Baltic culture out of which, with, of course, many borrowings from the Mediterranean, the present culture of the northern countries has developed. Racially, he believes, this stock is better adapted to the conditions that obtained in this ancient culture than to the modern industrial situation.

Dewey (2) finds that the philosophy of Kant with its recognition of the "two worlds"—that of sense to be studied scientifically and that of the inner moral self to be asserted—was a formulation of a deep-seated German attitude; he endeavors to show that this formulation has had considerable influence on the further course of German political and military life. The freedom of the individual is conceived primarily as an inner thing and consistent with compliance with external authority, while duty is determined not by consideration of the consequences of actions but by an assertion of inner worth.

Ellis (5) finds two contradictory statements from German sources as to the most characteristic element of the German spirit and attitude, Goethe placing it in the idea of personal freedom, others more or less definitely in the idea that the individual exists for the State. Both of these views may be true. "The same country may at different periods and in different aspects at the same period show unlike or even opposite attitudes toward life." Thus, the typical Spanish attitude may be represented by Don Quixote or by Sancho Panza, or the typical English attitude by Shakespeare or by Milton. The German spirit oscillates between the individualistic and the socialistic and also between extreme nationalism and extreme internationalism, the latter being best illustrated by the Germany of the later eighteenth century.

"The chief feature of the Russian character," says Parker (10), "I speak of the masses, for the classes are not unlike those of other countries, *i. e.*, somewhat loose and cynical—is the presence of 'soul.' The character is genuinely religious. . . . I cannot recall any self-assertive or boastful Russians; no doubt they exist, but it is not the national characteristic to be so."

Radosavljevich (17) also finds that deep religious feeling is a marked trait of the Slavonic peoples, and as other Slavonic traits he finds indicated in the national poetry a melancholy which has nothing to do with sentimentality or pessimism, a highly developed power of suffering and a humility and patience as opposed to the haughtiness and aggressiveness of the western European nations.

Woods (21) applies his "historiometric method" to the question whether war is diminishing, by counting up the years during each decade, century, etc., since 1450, during which each of the European nations has been at war. For all the nations taken together, the war curve shows a maximum in 1550–1600, and a general decline since, interrupted by a secondary maximum in 1800–1850. A group of "lesser nations," Holland, Turkey, Spain, Poland, Sweden and Denmark, shows a pretty definite decline since 1650, coincident with the decline in their political significance; whereas the greater nations, Austria, Prussia, Russia, France and England, show on the whole much less decline in the frequency of war. Of these greater nations, Prussia and Austria do indeed show the decline, while France, England and Russia show no marked change from century to century. The author urges that in answering the question whether war shows a tendency to diminish in prevalence we must take account of long periods of history, and discount temporary ups and downs; and believes that it is impossible to infer more from the evidence than that there is a certain probability that war tends to decline. It is not certain, he maintains, that the human race desires the cessation of war; for, though men are content in times of peace, certain of their inherent "tribal and gregarious instincts" are simply dormant then. "The war instinct is probably a different thing from the fighting instinct," the latter being individualistic and bringing the individual into conflict with his immediate group, whereas the war instinct is gregarious and seeks satisfaction in the rivalry of different groups, especially of neighboring groups.

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THEORETICAL ETHNOLOGY

BY ROBERT H. LOWIE

American Museum of Natural History

The activities of ethnologists, apart from purely descriptive work, have been largely concentrated on a definition of their aims and methods in relation to those of contiguous branches of science. On the whole, there is a decided tendency to assert the autonomy of ethnology, the frame of mind of most of the writers bearing some resemblance to the attitude of the biological vitalists in rejecting a definition of life in terms of physico-chemical causality.

Foremost among English protagonists of this view stands Rivers (8). While not repudiating an ultimate psychological explanation in principle, he insists that the immediate explanation of sociological phenomena must be drawn from the realm of sociology, not from that of some other science dealing with less complicated data. A very clear and able exposition of this attitude is independently developed by Hocart (3). Like Lévy-Bruhl, Hocart will have nothing to do with the sham psychological explanations of ethnological phenomena such as are familiar to readers of Frazer. But in marked contrast to the French philosopher, Hocart does not eliminate such explanation because of any fundamental differences between "savage" and "civilized" mentality. On the contrary, to him man "is much the same all the world over." "It is precisely because savages think in the same manner as we do that they think different things," for the same processes are at work on different traditional material. It is because of this psychological unity of mankind that psychology fails to interpret ethnology, for "from an unchanging quantity it is impossible to deduce the ever changing and endless variety of custom and belief throughout the world." These can be understood only through historical research. An ultimate psychological interpretation need not be repudiated altogether; but so far as the problems of the ethnologist are concerned it is irrelevant because it is not specific.

This is essentially the point of view assumed by Wissler (11). The field of ethnology is culture—the sum-total of human activities acquired by learning. Since psychology deals with innate phenomena, the two sciences deal with distinct groups of data; psychology can merely aid ethnology by discovering what is innate and what acquired. The specific problems of ethnology, such as the invention of the bow or the origin of exogamy, can be solved only historically for "all the knowledge of the mechanism of association in the world will not tell us why any particular association is made by a particular individual." In what may be considered his anthropological confession of faith, Kroeber (4) likewise insists on the irreconcilable disharmony between ethnology and psychology, which is here taken as a representative, together with biology, of the natural as opposed to the historical branches of learning. The sole aim of ethnology is to study the phenomena of culture regardless of organic facts; its sphere is the social, the individual data having a merely illustrative value. The causality of historical ethnology is teleological, not mechanical, and there are no laws to be discovered comparable to those of the exact sciences. This paper has evoked a spirited reply by Haeberlin (2), which vigorously protests against the hard-and-fast lines by which Kroeber separates psychology from ethnology. Psychology, he contends, is not biological in character, but as the science of *all* mental phenomena is ideally fitted to link the natural with the mental sciences (*Geisteswissenschaften*). Intimately connected with the paper already discussed is an interesting essay by Kroeber (5) on the psychology of scientific thought. Here the gap dividing the historical from biological points of view is again emphasized. Setting out from the reluctance with which Lamarckian factors are waived in some biological quarters, Kroeber finds the origin of this attitude in a naïve confusion of organic heredity with the transmission of cultural traits within a social group. "Use inheritance" is an observed phenomenon in the sphere of cultural evolution. By a psychologically intelligible but logically unwarrantable analogy some biologists continue to transfer the social fact to the realm of organic processes. As soon as the non-rational motives for their position are realized, refutation of the doctrine of the inheritance of acquired characters becomes as unnecessary as a scientific rebuttal of prenatal influences or other quasi-scientific survivals from darker ages. A somewhat less extreme point of view than that maintained by Hocart, Wissler, and Kroeber is advanced by Lowie (6). While dismissing the current popular-psychological interpretations of cultural facts, he is inclined to expect some aid from the more rigorous methods of scientific psychology. Some ethnological data may become more intelligible when viewed from the angle of individual psychology and psychology may "act as a corrective in speculative interpretation, . . . lend greater rigor to our formulation of fact and open new prospects of inquiry and explanation." As illustrations are cited the scientific investigations of dreams and Galtonian color and number symbolism.

The question of diffusion in its various aspects continues to occupy the attention of ethnologists. The most ambitious attempt to apply the principle of cultural transmission has been made by Rivers (9), who interprets Melanesian culture as the result of successive layers of culture corresponding to distinct groups of immigrants. An important feature of his scheme is the far-reaching influence assigned to relatively small bands of immigrants. Rivers's extensive use of diffusion is especially noteworthy because of the traditional preference of the English school for explanations of similarity by the psychic unity of mankind.

A number of relatively new tendencies may be mentioned as of some psychological interest. In a programmatic article Goldenweiser (1) contrasts the emphasis currently laid on the non-rational elements of primitive psychology with the neglect—at least, for theoretical purposes—of primitive man's actual *knowledge* of the universe. A systematic survey of this phase of the lower cultures would, he suggests, be of considerable interest. Radin (7) emphasizes the desirability of studying the myths and tales of primitive peoples not exclusively from the point of view of the incidents found and their distribution, but also as literary products. This means, among other things, that the individuality of the story-teller must be considered in the same way as a critic views the personality of an author. The individuality of exceptional personalities forms the subject of Wallis's essay (10). He is concerned with the relative significance of individual initiative and the stereotyping effect of social convention,—an old problem but here broached on the basis of ethnological material.

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SPECIAL REVIEWS

Character and Intelligence. EDWARD WEBB. Brit. J. of Psychol., Mono. Suppl., 1915, 1. (No. 3). Pp. 99.

This monograph presents one of the most elaborate attempts to quantify the exceedingly complex conative attributes of mentality by means of the best available statistical methods. Webb's main contribution is the statistical evidence for postulating a general conative factor, revealed by the method of correlation of correlations, which on the side of character, corresponds in its generality as a determinant of behavior, to the general intelligence factor, derived from mental tests by Hart and Spearman, Burt and others.

The subjects from whom Webb collected his data were two hundred students in a teachers' training school in London, and a group of 140 boys. Forty character traits of the training school students were assessed by a small group of prefects, the latter being officers elected by the student body and performing disciplinary and minor administrative duties. The character traits of the boys were assessed by two of the masters at each of the boys' schools. A series of mental tests were given to supply data for correlating intelligence attributes with character traits.

With the data so collected Webb tabulates with considerable completeness the correlations of every attribute with every other attribute, as well as the probable errors, and a reliability coefficient for each estimate.

Evidence for the existence of an intellective factor as a psychological entity is derived from the mental test data by correlating the columns of correlations according to the method of Hart and Spearman. This enables the author to compute the saturation coefficients of the character traits with the calculated general intelligence factor "g." Among the interesting findings in this regard these may be cited as correlating highly with general intelligence: power of getting through mental work rapidly, general tendency to be cheerful, desire to excel at performances in which the person has his chief interest, belief in his own powers, intensity of influence on special intimates, degree of esthetic feeling, degree with which one works with distant objects in view. Among the traits correlating negatively with intelligence we find: tendency to quick oscillation between cheerfulness and depression (as opposed to permanence of mood), degree of bodily activity in pursuit of pleasure, occasional liability to extreme depression. Among the traits which show practically zero correlation with general intelligence and which in consequence are to be considered as quite independent of intelligence are: tact in getting on with people, occasional liability to extreme anger, readiness to become angry, readiness to accept sentiment of associates, physique.

By applying the method of correlation of correlations to a selected list of character traits Webb finds substantial evidence for the existence of a general factor on the side of character. One might at first conclude that the common factor among character traits so revealed is caused by the general intellective factor extending its influence into the conative attributes. In order to ascertain whether this is actually the case Webb computes the partial correlations between the character traits, eliminating the influence of the calculated intellective factor. These partial correlations are again subjected to the procedure of Hart and Spearman with the result that the correlations, when corrected for attenuation, remain as before, hovering close to unity. Webb's conclusion is that a general factor on the side of character exists as a measurable psychological entity and that it is demonstrably distinct from the general intellective factor.

The physiological nature of the second general factor, which Webb proposes to designate "w," is distinctly a speculative matter. The correlations can undoubtedly reveal the existence of a common causal factor for character traits, but the nature of this factor must be inferentially arrived at by the interpretation of the correlations. Webb defines his second common factor tentatively as "persistence of motive." This interpretation is read into the perseveration tendency of ideas of Müller and Pilzecker.

It would be inappropriate to criticize dogmatically the painstaking statistical procedure of Webb's work. However, the conclusion concerning the second conative common factor would be considerably more convincing if the author had retained throughout the course of his work the comprehensive list of traits with which he starts out. As it is, the long list of forty character traits assessed by the judges dwindles down to eight in the table from which the crucial evidence concerning the second common factor is derived.

The author does not give us a table of saturation coefficients for the several character traits with reference to the new common conative factor. Such a table, when compared with the table of saturation coefficients for the same traits with reference to the intellective common factor, would throw much light on the makeup of the traits, and would be serviceable for practical diagnostic purposes. If some character trait could be found which possesses a saturation coefficient with the conative general factor comparable with the high saturation coefficient of reasoning tests with the intellective common factor, such information would throw light not only on the nature of a possible conative factor, but would be serviceable in defining the essence of character.

If the conative common factor should succeed in establishing itself as a psychological entity beside that of the intellective common factor, then we would be forced to give up the unifocal interpretation of mentality in favor of a multi-focal interpretation. In case common factors should multiply with unexpected fecundity we would have a state of affairs demanding a non-focal interpretation of mentality in which case every list of related attributes would yield its own common factor. Again, if future developments should reveal the existence of a limited number of definable common factors, then we would virtually be returning to a modernized faculty psychology. Before the proposed conative general factor can be accepted it will be necessary to derive it from a more comprehensive set of character traits than the list of eight used by Webb for this purpose.

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Paradoxical Pain. R. M. Harbin. Boston: Sherman, French, 1916. Pp. xxiv + 212.

Many books can be readily classified and summarized. This is not one of that kind. It deals with such diverse topics as digestion, parturition, fatigue, phagocytosis, intellectual effort, defeat, anxiety, pain in religion, altruism, warring for peace, temptation, remorse, death, divine discontent, immortality, and eighteen other topics within the confines of its 212 pages. Although by a surgeon it leaves the impression that it consists of notes for sermons, or that the deeply religious trend of the author has been the force compelling its publication.

The pain which is dealt with is both physical and mental, the latter not always being differentiated from the former. Pain is necessary for the development of the individual; the "man who never allows himself to get very hungry will not attain the highest degree of digestion"; "pain relieves pain"; "where pains are mental the patient suffers from fears and doubts"; a patient "recovered by reeducating his sense of pain"; "man is impelled by two motives in his psychic actions: the avoidance of pain and the pursuit of pleasure."

The book has no value for the trained psychologist, it may appeal to that widening circle of readers of pseudo- or near-psychology.

Shepherd Ivory Franz

Government Hospital for the Insane

Manual of Vital Function Testing Methods and Their Interpretation. W. M. Barton. Boston: Badger, 1916. Pp. 255.

Although intended for the use of physicians this work may be found by psychologists useful in studying certain functions of the body which are not open to direct observation. With the development of objective psychology many indirect methods must be used, and for ascertaining relations of mental conditions and physiological activities of certain parts of the body this little work will supply suggestions of method. The five parts deal respectively of liver function, kidney function, pancreatic function, heart function, and ductless gland function. In connection with any projected work on the relations of the ductless glands to emotional states some of the tests described may be of use, and similarly with respect to the relations of abnormal mental states to degrees of hypo- and hyper-function. The footnote references are sufficient to enable one who is interested in any matter to look up original sources and to extend the accounts of methods and results. In view of the importance which has been placed upon the conditioned reflex and the prominence given to the study of this reflex action of the salivary glands it is regrettable that the author has not included in his book any consideration of the saliva.

Shepherd Ivory Franz

Government Hospital for the Insane

Nervous Children; Prevention and Management. B. R. Tucker. Boston: Badger, 1916. Pp. 147.

This is one of the better class of popular works dealing with the subject of nervous and mental disorders of children. Ten chapters give the main points of the subject but there are no references to other works to which the less casual reader may go for further or more detailed information. Three chapters are devoted to the general consideration of the structure and functions of the nervous system, heredity and environment, and nervous and mental development. One chapter each is devoted to the defective and feebleminded, certain nervous and mental diseases of childhood, the cause and prevention of nervousness in children, the training of nervous children, habit, eugenics and sexual hygiene, and puberty and adolescence.

Different bad habits which children frequently exhibit are discussed under the chapter on "habit" which is defined as follows: "Habit, both good and bad, is the expression of the desire of the individual, according to his light, to better his condition." The author advocates some instruction in eugenics for children, and some slight instruction in sexual matters. With regard to the latter he says that we must "simply attempt to solve the problems as best we may, and then see what effect this question of sex instinct has upon the nervous, mental and moral life of children as they grow and develop into adults." The author shows caution in making definite rules for special cases and wisely suggests that all abnormal children be given the benefit of the advice of specialists.

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BOOKS RECEIVED

SIDIS, B. *The Causation and Treatment of Psychopathic Disorders.* Boston: Badger, 1916. Pp. 418. $2.50.

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NOTES AND NEWS

The present number of the Bulletin, dealing with Race and Individual Psychology, has been prepared under the editorial direction of Professor R. S. Woodworth, of Columbia University.

At the end of the course on speech disorders given at the Boston Psychopathic Hospital, a series of ten papers on stuttering and similar speech defects were read by Dr. W. B. Swift and assistants.

Professor G. M. Whipple, of the University of Illinois, has been given an appropriation by the General Education Board for the purpose of studying the school possibilities of the unusually gifted child.

Dr. Karl M. Dallenbach, of the Ohio State University, has been appointed instructor in psychology at Cornell University.

Professor B. T. Baldwin, of Swarthmore College, has been appointed lecturer in education at Johns Hopkins University, where he will give a course on physical and mental measurements, tests, and scales.

Professor F. C. Dockeray has been advanced to the grade of associate professor at the University of Kansas.

Professor R. M. Ogden, of the University of Kansas, has been appointed professor of education and head of the department at Cornell University.

Dr. Clara Harrison Town has been appointed psychologist in the Orthogenic Clinic of the Rush Medical College, University of Chicago.

Professor Josiah Royce, of Harvard University, died on September 14, at the age of 59.

Dr. H. Heath Bawden has removed to Carmel-by-the-Sea, Monterey Co., Calif.

Dr. W. T. Shepherd, professor of philosophy and psychology at Waynesburg College, has resigned to take up private school work in Washington, D. C.

A conference on aspects of psychological examining will be held at the Massachusetts School for Feeble-Minded, Waverley, Mass., on October 28. Twelve papers will be read by R. M.

Yerkers, E. E. Southard, S. L. Pressy, C. S. Rossy, R. S. Hardwick, F. Mateer, L. Wood, J. M. Curtis, and M. H. Rossy.

The American Psychological Association will meet at Columbia University on December 27 to 30. This being the twenty-fifth annual gathering of the Association, the occasion will be marked by appropriate exercises which are scheduled to occur on Thursday afternoon, December 28. On the evening of the same day there will be a banquet at the Hotel Marseilles, 103rd Street and Broadway, New York City. This hotel has also been named as headquarters. The address of the President of the Association, Professor Raymond Dodge, of Wesleyan University, upon "The Laws of Relative Fatigue" has been set for Wednesday evening, December 27, and will be followed by the annual business meeting and a smoker. Communications regarding the program of the meeting should be addressed to Professor R. M. Ogden, Secretary, at Cornell University, Ithaca, N. Y.; those regarding the local arrangements to Professor H. L. Hollingworth, at Barnard College, Columbia University, New York City.

The following items have been taken from the press:

A. Charpentier, professor of medical physics at the University of Nancy, has died at the age of 64. His work dealt mainly with light and vision.

The Boston City Council has passed an ordinance that will give the city police court a medical department and psychological laboratory. All offenders will pass through this department, the verdict of which as to their mental condition will be taken into consideration before sentence is pronounced. Dr. Victor V. Anderson is appointed as head.

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THE PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

DYNAMIC PSYCHOLOGY

BY F. L. WELLS
McLean Hospital

Watson's (13) presidential address begins with reviewing the development of his behaviorism concept since its formal launching. Then he discloses in the conditioned reflex a very promising method for putting the concept to the test of action. First he describes the conditioned salivary reflex, but it is difficult to adapt the technique to human beings, and other phases of conditioned reaction are preferred for investigation. An important footnote hints at the relationship of the conditioned reflex to certain pathological symptoms. His main problem has lain in training differential reflexes; that is, reflexes which are educated to appear to certain stimuli to the exclusion of other similar ones. Its relative independence of coöperation and availability in human and infrahuman subjects are features to be emphasized. The latter it shares with the "multiple choice" method. He takes a hopeful view of its application to pathological cases which cannot be reached by means of language, and seems indeed to have laid his hand on a most valuable instrument for their study.

Hollingworth (3) presents a review of different psychological methods available for vocational guidance, and the principles underlying their application. The apparent need of supplementing vocational training by vocational selection leads to the work the volume describes. A very useful list of sources for material, etc., is appended to the book.

Adams (1) reviews the work that has been done in "testing the tests" of merit in advertising, and recounts an original experiment in this direction, using mail-order material. The general tendency of his results is negative. Analysis is given of different measures of advertising merit, and of the sources of error in laboratory tests of advertising.

A long step forward in the field of mental testing is marked by the appearance of Terman's (12) book on the Stanford revision of the Binet series. The opening third of the book is occupied with a discussion of the functions of intelligence testing, to which he gives a broad interpretation, some historical accounts, and general criticisms. The remainder takes up the tests for the different years one by one, and gives for each the procedure, the scoring, and various remarks.

The free association test seems to be one of marked intrinsic merit, which does not reach the full measure of its usefulness because it has not attracted the body of investigation that has grown about other experimental methods. Two interesting studies of Lange (6, 7), on pathological changes of association type, and its rôle in the interpretation of persecutory delusions, are simply mentioned here. A suggestion is thrown out by Moore (9) for using an allied test in measuring the strength of instinctive tendencies. Dooley (2) reports a study by this method of "normal complexes" using the term in Hart's sense. "Common" and individual complexes are distinguished. The rôle of unconscious factors in determining associations is substantiated, but no ground appeared for formulating a general operation of sexual or infantile factors.

The translation of Jung's (5) *Wandlungen und Symbole der Libido* by Dr. Hinkle is the most conspicuous contribution of the psychoanalytic school. This is a review, quite extensive, not very systematic, and varying much in convincingness, of a fascinating subject in the relation between the contemporary "unconscious" and the contents of former myths and folk-usages.

In observations of a single case, Schneiter (11) carries out the notion of a common mechanism in primitive and pathological ideas. Thus he relates pathological delusions to various myths. In this connection should be read an article by Lowie (8), who points out that similarity of content is not a sufficient criterion for unity of origin in folk-ideas. Not logical, but pre-logical (unconscious?) associations are the essential factors in these symbolisms. He is particularly impressed with the number-form phenomena recorded by Galton, and with their seeming to be hereditary. He feels that in a similar way numbers and other ideas could come to have symbolic associations whose spread would be facilitated by the fact that there is so much blood-relationship among primitive communities.

In Read's paper (10) the distinction is made between two types of animism, (1) the proneness of uncultured people to explain natural phenomena by the action of spirits (hyperphysical animism); (2) the endowment of objects in general with animate and purposive consciousness (psychological animism). Examples are given illustrating how such illusions are stopped short of interference with vital needs of the people, and how on the other hand they are allowed to interfere greatly with the group's economic welfare. Four classifications of beliefs about animism are explained, and conditions are described which favor an object's acquiring animistic properties. Political evolution has an important part in the development of animism, the different hierarchies of this world being reflected in those of the other. Low-grade tribes have little animism; religion begins with the differentiation of superior beings, which in turn contributes to the dissolution of animism.

In a paper on repression and memory Ernest Jones (4) considers that while the action of repression is seen mainly at the transition points of the various levels of consciousness, these tendencies appear to be generally distributed, increasing in strength as one approaches the lowest layers of the unconscious. Though there is much agreement that pleasurable impressions are the better attended to, ideas not apprehended in consciousness may make a deep impression below this level. Considering the capacity of the unconscious for storing up impressions, the problem becomes rather, why so little becomes conscious. The force maintaining forgetting seems to come from the direction of consciousness rather than the unconscious. Repression also affects, secondarily, ideas that are connected with the unpleasant one. The emotion may be repressed independently of the other elements of the idea. The author greatly extends the rôle of repression in forgetting, classifying it for convenience into hedonic repression, which inhibits ideas through their special unpleasantness, and the utilitarian repression of simply irrelevant ideas, which derive such unpleasantness as they have, merely through the fact of their irrelevance.

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INSTINCTIVE TENDENCIES IN MAN

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In man instinctive tendencies are much complicated through intermixture with environmental factors, consequently considerable confusion exists both as to characterizations of the various instincts recognized and as to methods of studying them. Thorndike (37) has made a creditable attempt to clear up some of these difficulties. Man's original nature is first stated in neural terms, and secondly, when this leads nowhere practically or experimentally, in terms of tendencies to response. These tendencies must each be defined "as a situation, a response and a degree of probability that apart from training the latter will happen when the former does." He finds our knowledge of instincts on very insecure foundations, especially that gained from the questionnaire method; and offers a tentative inventory and description largely on the basis of personal "observation and judgment."

Moore (20) outlines an experiment to determine dominant instinctive tendencies, based on the association tests. Subjects are to respond to words significantly related to particular instincts.

Myers (21) describes the movements of a developing infant, and finds a slight but questionable preponderance of left-handedness to the 189th day, after which the child almost invariably reached for things with the right hand. Dupuis (12), in conformity with his "psychasthenic theory" of timidity, describes cases of timidity in terms of motor and social anomalies, various degrees of slowness or weakness (*lenteur*) of movement and of "social apraxia" being found in association with mild forms of "hyperesthesias of the self." Folsom (13) recalls memories of his child play-world, showing stages of different interests. Coover (10) finds experimentally no basis for the rather common belief in an instinctive feeling of being stared at. Cannon (4, 5) describes the "effects" on certain viscera of some of the stronger emotions, and shows that by the secretion of adrenalin the individual is prepared for emotional crises. He agrees with Sherrington in finding only slight differences in reaction in the viscera for the different kinds of emotion. He shows a tendency to regard emotion as forces producing these visceral changes; his book and article, however, are loaded with useful facts. Crile (11) shows this same view, but is far less scientific. Angell (1) examines objections by Cannon and others to the James-Lange theory of emotion and finds the latter, when properly understood, untouched by any evidence thus far established. Titchener (39) traces the antecedents of James's theory and concludes that "James's acceptance of the complete novelty of his theory must . . . be left to stand as something of a curiosity in the history of psychology." Of recent important texts Titchener's (40) discusses instincts in connection with emotions and avoids in the consideration of their origin the author's former questionable position of assuming the transmission of somatic changes. Pillsbury (26) devotes considerable space to instincts, and seems to follow Cannon in the view that emotions *cause* visceral reactions and certain secretions. This same position seems to be taken by Jastrow (18) who frequently refers to emotions as causes that "move to action." He gives valuable detailed descriptions of modification of emotions into sentiments, and follows Shand (34) in regarding emotions and sentiments as dominating conduct. McDougall more definitely characterizes and describes the functioning of the sexual instinct (22, 23) than he has heretofore done.

The importance of the instinctive basis of human conduct, for which to the reviewer's mind McDougall (22, 24) more consistently argues than do those who place the motivation in the emotions, seems to be gaining ground. Wallas (47), who accepts this general position, places the emphasis on the emotional aspects, due to a less accurate psychological basis, and rejects the view that thought is a mere "apparatus" set in action by the instincts; but he makes the tendency to think a separate instinct! Other writers emphasizing the importance of instinctive tendencies on thought and action are Cabot (6), Courtis (8, 9), Hall (14, 15), who urges the extension of Freudian conceptions to other instincts besides sex, Putnam (29), Santayana (33), Trotter (41), and Wright (45). It is regrettable that the limitation of space does not permit more notice of these contributions here. Special instinctive tendencies are discussed, often without careful definition and clear conceptions of instinct, by writers whose work can only be indicated (2, 3, 7, 16, 17, 27, 28, 30, 31, 35, 38, 43, 44). Play gets a large share in this list. Many writers are finding "real life" as well as cure from many evils in instinctive activities like play.

Watson (46) and Parmelee (32) give valuable discussions of the origin of instincts, the former suggesting that a special mechanism for, and hence instinct to, language habits is the chief basis of difference between the behavior of man and that of higher animals. Watson emphasizes Mendelian factors, the non-transmissibility of "continuous variations," and, somewhat inconsistently and on the basis of questionable experimental evidence, the transmission of "acquired characters." He regards instincts as a chain of reflexes.

Stout (36) and McDougall (22, 23) have revived in a measure the innate idea, or rather have developed an innate perception, doctrine. Morgan (25) reacts against this tendency, but accepts it in a measure with misgivings. It seems to the reviewer that more careful attention to the rôle of experience in effecting differentiations in stimuli to instincts would be in order before such speculations are taken seriously.

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VOLUNTARY PHENOMENA

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Abramowski (1) set his subjects the task of inhibiting the emotional response to various stimuli—lights, noises, words for associative reaction, numbers for calculation—using the psychogalvanic reaction as the indicator of emotion. Of the 24 subjects tested, a few certainly reduced the extent of the galvanometric deflections; a few gave larger deflections when they tried to inhibit emotion than at other times; while others gave no consistent result. The results for all the subjects taken together are so irregular that they might be interpreted simply as chance variations; but the author rejects this interpretation in the case of those subjects who gave a consistent result, especially when the result was in harmony with the known strength or weakness of their habitual voluntary control over their emotions. He is able also to exclude the hypothesis that the inhibition, when it occurs, results from the interference of one emotion with another; and believes that the only possible explanation is in terms of voluntary effort inhibiting emotion. The fact that the control improved with practice seemed to substantiate this view. Introspective testimony, though vague as regards the mechanism of control, made mention frequently, in the case of the successful subjects, of voluntary effort directed toward the isolation of the deeper self from the influence of the stimuli, and the creation of a "mental void." The author conceives this process as an auto-hypnosis, which maintains by suggestion a state of indifference towards the stimuli, and produces an asthenic state of the organism, one effect of which is the diminution of the psychogalvanic reactions. He found that voluntary changes in respiration had no regular effect on the psychogalvanic reaction, and that voluntary contraction of the muscles, while it produced a diminution of the psychogalvanic reaction in most individuals, failed to do so in some of those who were able voluntarily to inhibit the reaction. Alcohol and opium, administered because of their circulatory effects, also had no uniform effect on the psychogalvanic reaction. From these results the author infers that the voluntary inhibition of the reaction is not accomplished directly through these organic changes and without reference to emotion. He also paid some attention to the state of the respiration and muscular tension while the subject was endeavoring to inhibit emotional responses, and found the respiration somewhat slowed and considerably lessened in depth, while the muscular tension was increased in some subjects, but not in those who had most success with the inhibition. It seems possible that some individuals seek to control their emotions by an inner concentration, and others by an outwardly directed effort.

Facilitation and inhibition, so important in reflex action, are looked for by Langfeld (5) in the sphere of voluntary movement. He employs the tapping movement for his purpose, using the first, second and fourth fingers of each hand in a variety of combinations, alternating and simultaneous. The first and second fingers tapped at almost the same rate, the fourth much more slowly; the fingers of the left hand generally were slower than those of the right, but the index of right-handedness differed considerably with the different combinations.

Simultaneous movements. If the rates of two fingers, tapping singly, are about the same, the rate of the two tapping together is again about the same, sometimes a little greater in the case of the first and second fingers of the same hand. When two fingers tap singly at quite different rates, both together generally tap at an intermediate rate, though sometimes not more rapidly than the slower of the two. The faster finger usually pulls the slower along with it to some degree, or facilitates its movement, while being itself impeded or partially inhibited. The results in detail suggest, without fully proving, that the facilitating influence of the faster upon the slower finger increases with the difference between the rates of the two fingers, and also with the degree of bilateral symmetry between the two.

Alternating movements. A "trilling" movement of the first and second fingers of the same hand gave almost always a rate for the two fingers together faster than either could reach alone; but the rate of each finger was less than it reached alone. Here inhibition was clearly exerted by the one finger upon the other, and was especially strong because the trill requires opposite movements of adjacent fingers to be executed simultaneously.

Warren's extensive study of purpose (7) includes a consideration of vitalism and of the rôle of purpose in nature generally, as well as an analysis of the purposive consciousness, this psychological part of the study lying however at the basis of the whole. The most general characteristic of the experience of purpose is that an idea or forethought of an occurrence precedes the actual occurrence, instead of the idea following the occurrence, as in perception. There is thus a reversal of the temporal sequence of events, as usually conceived; and the future appears as conditioning the present. The forethought may be in verbal, pictorial or (conceivably) non-imaginal terms; its only distinguishing mark is its reference to the future. Besides the forethought, there is always present in the purposive consciousness a factor of assent, which, on analysis, proves to consist of kinesthetic and organic data—"an incipient tension of the muscles concerned in the movement, and of the finer muscles which produce an adjustment of attention, . . . often accompanied by modifications of breathing and circulation," all combined to produce an indefinite conscious attitude, the assent. The so-called *fiat* is probably not a distinct factor. When the object of a purpose is ideational rather than motor—as in trying to recall a name—the forethought is only a partial representation of the event, and the assent is delayed in its appearance, since the problem leads involuntarily to experiments towards its solution.

Besides these two essential factors, the purposive consciousness may also include a "potency-feeling," closely related to assent, and like it kinesthetic, consisting either of the sensations of the actually executed movement, or of the memory image of such movements. This potency-feeling is not to be accepted as a guarantee of real potency of the sort conceived by the theory of ideomotor action. Nor is the potency-feeling necessary to the execution of the purpose; it occurs mostly with complex forethoughts and when deliberation precedes the assent.

Another factor in purpose is the self, since the act proposed is to be one's own; but this self-factor is usually implicit, becoming separately conscious only "in complex cases of deliberation and so-called volition," and traceable then "to kinesthetic elements which arise during the process of fulfillment." Finally, the purposive experience may include, at its fulfillment, a sense of fitness (or unfitness), compounded of recognition and satisfaction. Delay in the fulfillment brings the sense of unfitness, and fulfillment after delay that of fitness. "The fitness experience is both a judgment and a feeling."

There is a fundamental tendency, says Rensi (6), for a wish to execute itself in action. Since, however, the performed act does not always yield the expected satisfaction, there arises a selection, on the basis of experience, of acts that produce satisfaction as against those that do not. This is a selection of means. But since, further, there exists a plurality of desires, the satisfaction of one interfering with that of another, there comes likewise to be a selection of desires, or of ends. The more inclusive ego suppresses the tendencies of the less inclusive, introducing thus the principle of utility into the life of will in addition to the principle of satisfaction which is present when a single egoistic tendency is unrestrained. The systematizing of tendencies under the principle of utility which thus results from the domination of the less inclusive by the more inclusive self cannot, however, give rise to anti-egoistic conduct. The source of self-denial must be sought outside the self. Self-denial is a real phenomenon, sometimes occurring with no motive beyond that of self-denial, and sometimes with an altruistic motive.

Wieg-Wickenthal (8), considering will from the standpoint of the psychiatrist, finds it more fundamental than intellect. Sensation and image play a very subordinate rôle in mental disorders, the most important and frequent disorders arising from a morbid will-function, an insufficient biotonus in the mental realm. The symptoms of all forms of dementia precox can be understood as due to lowered biotonus with consequent weakness of active and passive apperception. The primarily intellectual insanities are rare. The author recommends the study of Schopenhauer. Kohnstamm (4), approaching the matter from much the same angle, maintains that life is subject to both causality and finality. "A need is no pure natural cause, . . . but a *causa finalis*, an end-cause; and exactly the same is true of a motive." Finality is the great characteristic of life processes, and in voluntary processes it comes to light as the consciousness of freedom.

Gemelli (3), in visits to the front and to hospitals, examined soldiers who had distinguished themselves by deeds of heroism, and compared them with others who had shown "nervousness" in the same situations. It appeared that the courageous soldier was not an exceptional individual, but often one of quite ordinary characteristics, who had been molded into the war mold. The molding process consists, on the negative side, in a detachment from family affections and all the ordinary interests of life. These are not lost but laid aside. The soldier lives in the present, his acts not being related to his past and future, as in ordinary life, but being determined from without, by the command of the officer. On the positive side, the molding process consists in an assimilation to the social medium and its guiding sentiments of honor, esprit de corps, discipline, and love of the company. Patriotism is too far-away a motive to have much effect. Besides this transformation of the personality, another factor predisposing to courage is the constant excitation from the neighborhood of so many other men, from the noise, the sight of wounded men, etc. A state of tenseness and readiness results which favors vigorous action at the word of command.

Ferrari (2) also seeks to revise the conception of courage in the light of recent experience. At the outset of the war, the current picture of courage was that of a soldier advancing unmoved upon the enemy and meeting death without a lament. But the special conditions of the present war have been met by an adaptation, in which courage has taken a form more useful in the circumstances. It is only the novice in the trenches that shows bravado. In the first months of the war, when an officer called for volunteers for a specially dangerous task, there were always twice as many as were wanted. But now the men prefer that the officer designate who is to go; all are prepared to go without hesitation, but only within the limits of the needful as determined by the officer; and the soldier prefers that the responsibility for special exposure rest with the officer rather than with himself. Courage has thus taken a less impulsive, more rational form. The degree of courage varies from day to day and from hour to hour, often without obvious cause. Stimuli that raise its level include (1) the example of a superior, acting by motor suggestion (or "sympathy") to produce the behavior and secondarily the state of mind of courage; (2) the presence of an inferior arousing one's self-assertion or sense of responsibility; and (3) the presence of comrades. Acts of insane heroism done through excess of fear are very rare, probably because the neurotic individuals who might behave in this way have been weeded out before reaching the front. Trench life seems to leave no obsession of danger behind, except in cases of exhaustion.

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VISUAL MOTOR FUNCTIONS

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In each of the five years since our last review of visual motor functions the number of relevant titles has decreased. Superficially this might seem to indicate that psychological interest in the eye-movements was also gradually decreasing. That this apparent indifference is not real there is evidence in the call for photographic recording apparatus and in the informal reports of investigations under way. The falling off in titles seems rather to be due to a change of emphasis from direct investigation of the eye-movements themselves to a study of their interrelation with other activities. The reviewer believes that this reactionary shift of emphasis is unfortunate if it indicates a tendency to regard our present data as adequate for the interpretation of related psychological problems. As the recent studies show, the unsolved problems concerning the eye-movements are both important and numerous.

Of new methods there is only one to report. Gertz (3) used changes in the shape of the phosphenes which are produced by the retinal currents of action to indicate eye-movements. The method is certainly ingenious. We have no comparative data on which to estimate its relative sensitivity. All the traditional methods have been used more or less in the papers reviewed. A pneumatic device activated by the eccentric cornea is described by Schackwitz (11). He mounted a distended rubber capsule on a spectacle frame so that it rested on the eye-lid at the edge of the cornea. Distortion of the capsule produced by eye-movement was recorded by a sensitive tambour on smoked paper, or by a Marbe smoke recorder. Schackwitz calls attention to the safety, simplicity, and general availability of his device. The accompanying curves of reading differ widely in the accuracy with which they represent the true eye-movements which are involved in reading. This perhaps indicates only the lack of a standard technique of adjustment. The unnatural partial closure of the recording eye, the interaction of lid-movements, and the impracticability of any quantitative evaluation of the amplitude of movement, seems to limit the usefulness of the method to a record of the number of fixation pauses. For such a purpose some such instrument as Freeman's[1] is simpler and probably more reliable. Direct observation of superficial topographical marks was used by Gertz (3), Loring (7) and Oehrwall (10). After-images were used by Gertz, Marx (9), and Oehrwall. Gertz also used a sensitive ophthalmological method, observing the retinal image of a Nernst lamp filament at the optic disk. The cinematograph was used by Weiss (13), but apparently without knowledge of Judd's important contributions to the method.

German and Scandinavian writers are commonly using the descriptive class term "saccadic" to denote the rapid eye-movements for which we have only the arbitrary name of "type I." I am not sure with whom the term originated, but it seems worth adopting. The class term "gliding movements" as used by Gertz seems less valuable. The several classes of "gliding movements," viz., the pursuit, coördinate, reaction compensatory, convergence-divergence, and torsion movements are so different in origin, latency, and angle-velocity that they can seldom properly be grouped as one class. The only common element seems to be that all the gliding movements are moments of relatively clear vision.

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[1] Freeman, F. N., *Experimental Education*, 1916, p. 95.

All the main types of eye-movements are represented in the studies under review. The angle velocity of the "saccadic" movements was measured by Weiss (13), for movements of approximately 35 degrees in various directions. The average duration was 0.106 second; raising the line of regard was slowest, 0.130; lowering it was most rapid, 0.080. The duration of concurrent lid-movements in raising and lowering the eyes coincided closely with the eye-movements. Weiss reports that there were no lid-movements with horizontal eye-movements. This is certainly not universal.

Oehrwall (10) compared the accuracy of fixation of a motionless point and a point moving in straight lines and regular curves. Fixation under the latter circumstances was better, especially when the head was unrestrained. He independently rediscovers and thus confirms a number of eye-movement phenomena; such as the inability to see during saccadic movements, the general incapacity for voluntary pursuit glides without adequate stimuli, the irregularities of fixation, together with the pulsations of a supposedly rigidly held head.

The lack of latency and the relative accuracy of the coördinate compensatory movements is independently rediscovered by Gertz (3). He found errors of less than 5 per cent. in half his subjects, though one subject showed overcorrections of 20 to 30 per cent. He rediscovers the tendency for the compensatory movements to overpower the intention to fixate, when the two are opposed. Studying the limits of successful pursuit, he found fewest intercurrent saccadic, corrective movements when the angle velocity of the fixation object was one degree per second. Saccadic movements increased as the velocity decreased, until at ten degrees per second differentiable pursuit glides entirely disappeared. The accuracy of pursuit is notably decreased by fatigue. He rediscovers pursuit movements with peripheral stimuli. But he also reports true pursuit movements when he tried to follow movements of his hand in the dark. Still more surprising was his development of the capacity to glide across a fully illuminated visual field. This is contrary to all previously published observations. Unfortunately no graphic records of these eye-movements were made. In his own case he depended on the somewhat dubious glide "feeling," supported by the visual illusion of motion. But he directly observed these gliding movements in the case of his brother who apparently developed the unusual capacity as a child at play. Graphic records alone would indicate how far convergence tendencies might account for the phenomenon. His theoretical discussion suffers from his lack of familiarity with the psychological literature concerning the rôle of the pursuit movements in the perception of motion.

The extraordinarily comprehensive study of the compensatory eye-movements reacting to semi-circular canal stimuli by Högyes (5) is translated by Sugár from the Hungarian original in the *Annals* of the Budapest Academy of Sciences. This otherwise inaccessible work has more than historic interest. It is a mine of fine observations and operative experiments.

Convergence capacity was measured by Howe (6) by the use of prisms, not only with respect to the initial strength of the respective muscle groups, but also with respect to its fatigue.

An excellent survey of nystagmus is given by Bartels (1). The paper may properly be called a compendium of nystagmus.

Torsion movements were studied by Miss Loring (7), with an excellent telescopic technique. She found the phenomenon highly irregular. While increasing deviation of the line of regard from the primary position was in general accompanied by increasing torsion, the latter varied enormously for different individuals and more or less also for different eyes of the same individual. Vertical and horizontal movements are accompanied by torsion as well as oblique.

With respect to the interrelation of the various types, Wichodzew (14) found that compensatory torsion of the eyes, consequent to inclination of the head towards either shoulder, decreases the binocular field of regard as well as the capacity for divergence and convergence. These restrictions of motility seem to follow from the partial contraction of the eye-muscles in maintaining the reflex torsion, thus preventing their free interplay for other operations.

A "peripupillometer" made by Zeiss and described by Schlesinger (12) is capable of unusually precise adjustments. Schlesinger found a normal pupil threshold of 0.7 meter candles, varying with age and other conditions. The reflex is fatiguable; but when fatigued for one color it is unfatigued for others. The central receptor area for the pupil reflex he found to be 3 mm. in diameter. Forster and Schlesinger (2), using the latter's peripupillometer, found no pupil unrest for either normal or pathological subjects, if the eyes were accommodated for distant vision and the illumination was weak. The authors refer the unrest that Weiler found either to changes in light intensity or to slight changes in accommodation. The lack of pupil unrest in dementia præcox under similar circumstances follows from the indifference of the subject to external stimuli.

On the basis of its retention in cases of paralysis of the oculomotorius, Hess holds that the pupil reflex in near vision is associated with accommodation rather than with convergence.

MacDougall (8) sought to ascertain the influence of eye-movement in judgments of number by comparing judgments of the number of stimuli in configurations which were supposed to limit eye-movement with similar judgments when the stimuli were in configurations which were supposed to induce eye-movements. It is incomprehensible to the reviewer that the author made no effort to use any of the various standard means of observing or recording the eye-movements which were actually induced by his arrangements of material. His assumptions concerning the influence of configuration on eye-movement affect to ignore the experimental work of Stratton, Judd, McAllister and others. He worked under the illusion that clear vision is possible during eye-movements of the first type. These omissions are the more deplorable since his study of the effects of configuration on judgments of number is so thorough. His assumption that these effects are the results of eye-movement tendencies seems to be rendered untenable by the fact that in the one instance in which eye-movements were experimentally introduced, the experimental results are opposed to his generalizations.

Marx (9) sought to determine the value of sensations from the external eye-muscles and conjunctiva for spatial orientation, by measuring the accuracy with which the eye could maintain a given position after the preliminary fixation mark had disappeared. Deviations from the original position were measured on a coördinate system by the apparent eccentricity of the after-image of a Nernst lamp filament, which was exposed by a photographic shutter at the original fixation point, after the eye had been left a predetermined time in total darkness. He found that in general the deviations from the original position increased directly with the time up to ten seconds. They regularly showed characteristic individual peculiarities of direction and amount. They were decreased by peripheral marks, but were increased when the original fixation position differed from the primary position of the eye. Since in the latter case the muscle sensations are increased, Marx concluded that sensations of muscle strain play no important rôle in the maintenance of position. He also rules out sensations from the conjunctiva, because cocainizing the tissues had no effect on the errors. Muscle and conjunctiva sensations can only supply gross data for orientation. The tendency to approximate the original position of the eyes even in the dark is ascribed to the general tendency of the eye with relaxed muscles to return to the primary position. He explains autokinetic phenomena by the hypothesis of nystagmoid drifts of small extent. The novel question as to how accurately one can fixate the unmarked center between two peripheral stimuli in an otherwise darkened room found experimental answer in close analogy with the errors of fixation in the dark.

The occasional observations of concurrent eye-movements in special studies like reading, the perception of motion, the effect of drugs, and disturbances of the inner ear lie beyond the scope of this review.

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REACTION TIME

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Topciu (3) studied successive reactions with the right and left hands to two stimuli with ten graduated intervals from 50σ to 720σ, the problem being to determine the dependence of the reaction times on the amount of the interval. With the shorter intervals the time of the first reaction was lengthened through the inhibiting and distracting influence of the second stimulus. The time of the second reaction decreases uniformly, as the interval increases, up to the optimal interval of 520σ and then increases again. The threshold value between a unitary and a discrete apperception of the two stimuli is calculated to be at about 229σ or half the optimal interval. When the length of the intervals was known the effect of the shorter intervals was much less marked though here also there is an optimal interval of about the same length as with irregular variation of the intervals.

Woodrow (4) finds that the reaction times to the cessation of sound and light stimuli and to the beginning of the stimuli show no appreciable differences. Differences between sound and light reactions and variations with the intensity of stimuli are the same for cessation as for beginning. The bearing of these facts on the various theories of nervous action is discussed in detail. "The explanation of the experimental data . . . seems to require us to regard the central nervous system as not merely a network of paths, but also as a seat of a complex system of interrelated activities and potential energies which is disturbed by any change in any part of the system. The fact of cessation reactions can not be adequately explained without postulating such a central system of energies, the balance of which may be upset by either an increase or decrease of activity in any part of the system."

Burtt (1) found in tests of subjects walking on the street under various conditions of illumination that the attention is at a higher level, auditory reaction time is quicker and the efficiency of motor coördination is greater under a non-uniform street illumination than under a uniform illumination. Experiments in the laboratory, with rhythmic variations in illumination intensity in the room or shadows to reproduce the street conditions as nearly as possible, corroborate these results though the effect in the laboratory was less marked. The practical implication is that "non-uniform illumination is more conducive than uniform to safety on the street."

Poffenberger and Morgan (2) subjected Dunlap's method of adjusting the Hipp chronoscope without armature springs to a rigid test and concluded that the method is more accurate than that with the spring adjustment and removes the necessity of accurately controlled current source, when the four conditions—the equality of windings and cores in the two sets of magnets, the equality of currents in the magnets, the proper adjustment of the chronoscope, and that the current acts upon the two magnets for approximately the same length of time or that this difference has no appreciable effect—are fulfilled.

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RIGHT- AND LEFT-HANDEDNESS

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Doll (1) confirms the results of earlier investigations in finding the incidence of left-handedness far greater among the feeble-minded than among normal subjects. He says (p. 58): "The feeble-minded of all grades are predominantly left-handed in strength of grip, as is shown by the superiority of the averages for left grip over right and the high correlation existing between them. These results do not show a tendency toward ambidexterity but towards sinistrality at all ages and grades." Examination of his tables shows the following results: of the 123 girls whose grip was measured 47 per cent. had greater strength in the right hand, 6 per cent. had equal strength in the two hands and 47 per cent. had greater strength in the left hand; of 310 boys there were 51 per cent. with greater right grip, 5 per cent. with equal grip for the two hands, and 44 per cent. with greater left grip. Those with a greater left grip show a greater relative difference between the strength of the two hands than do those with a greater right grip.

Nice (5) reports the case history of a left-handed child who, for the first two years of her life, was encouraged to use her right hand. After two years this effort at training was discontinued. She showed delayed speech development with sudden improvement at three years and seven months. The author's opinion that the retarded speech development was caused by training the right hand is not a conclusion necessitated by the results cited.

In a readable little book on ambidexterity Macnaughton-Jones (4) reviews some of the experimental results in studies of right- and left-handedness, gives some attention to the neurology of these functions, and deals at length with the advantages of bimanual education.

Jones (2) made measures of girth, length and tapping rate for the two arms of right- and left-handed subjects, as well as of those whose handedness had been reversed by training. He reports that bone measurements are diagnostic of born handedness whereas muscle measurements are diagnostic of adopted handedness. The ten thousand cases said to have been measured are not reported in full, only sample cases being given. In rate of tapping the group whose preferred handedness was transferred by education do not show as great facility with their best hand as do either of the other two groups.

Lippert (3) contributed a brief note upon experimental work done on sixty-one boys. The material given does not admit of any conclusions being drawn.

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FATIGUE, WORK, AND INHIBITION

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Crile (2) presents a well-rounded theory as to the causes and effects of fatigue. The adaptive mechanism by which man adapts himself to his environment is called the "kinetic system." This is made up of the brain, adrenals, liver, thyroid, and muscles. The brain is activated by the environment within and without the body and is the initiator of the response; the adrenals act as oxidizers, making possible the transformation of energy and the neutralization of the resulting acid products: the liver is the chief fabricator and storehouse of the carbohydrate fuel by which muscular action and heat are produced, and it also plays a rôle in the neutralization of the acid products; the thyroid through its secretion facilitates the passage of the nervous current and in consequence would seem to govern the rate at which the transformation of energy is affected; the muscles perform work through the transformation of energy into heat or motion. Regardless of the cause of activation, whether it be physical or mental work, shock, emotion, or the presence of toxins, there results identical changes in the brain, adrenals, and liver. "Increased activation produces increased acidity which in turn throws increased work upon the organs by which the neutralization of work is accomplished." Depending upon the cause of activation and the particular strength or weakness of the various organs of the body there results from excessive activation normal fatigue, exhaustion, neurasthenia, insanity, Graves' disease, cardiovascular disease, diabetes, indigestion, Bright's disease, apoplexy, acute acidosis, etc. According to Crile, fatigue and exhaustion are general results due to the sum total of available potential energy being expended.

Dockeray (3) finds "that the effect of physical fatigue upon mental efficiency, as expressed by addition and multiplication, is very irregular." He presents two theories which seem to be more or less borne out by his results, although he is doubtful if the first one could be made to account for all the facts. The two theories are: "(1) It may be that fatigue products generated by the physical work, either in the motor neurones or in the muscles, spread through the circulation to the association centers and cause directly a diminution in the efficiency of the association processes; or (2) it may be that the sensations that accompany fatigue serve as distractions and thus cause a decreased attention."

Lahy (5, 6) finds no change in blood pressure as the result of soldiers marching all day, but does find it in the cases of linotype operators and an assistant working about the laboratory all day. Other more mental operations, such as attention, memory, visual acuity, etc., do not show any characteristic changes.

Painter (9) attacks Thorndike's assertion that, when Miss Arai required twice as long after twelve hours' work to multiply mentally a four-place by a four-place number, this did not mean a reduction of 50 per cent. in efficiency, for if she had then attempted a three-place by a four-place number she would still have shown more than 50 per cent. efficiency. After preliminary practise and after a hard day's work, he commenced multiplying four-place by four-place numbers. From 11 P.M. until 3.07 A.M. he continued with a steady increase in time devoted to each problem. When he was unable longer to do this task he attempted a three-place by a four-place but could not do this either. "When ability mentally to multiply a four-place by a four-place number had come to a stand-still as a result of extreme mental fatigue, ability mentally to multiply any number by any other number was lost."

Poffenberger and Tallman (10) find in short mental tests lasting less than a minute upon long-practised subjects that the first half is done almost always in less time than the second half. They conclude that "mental fatigue is not so rare as is sometimes supposed, but that the repair process is so rapid compared with muscle repair, that as work is usually done, the loss may be compensated for during brief intervals of relaxation."

Robins, Smith, and Washburn (11) report that on the whole "affective sensibility to colors tends to diminish with ennui produced by a long series of judgments," but there were, however, many exceptions to this general tendency.

Langfeld (7) studied simultaneous and alternating finger movements in tapping and found many interesting cases of inhibition. For example, if the index and second finger are tapped simultaneously the resulting rate is faster than the rate of the slower finger and may even be more rapid than the faster finger when tapping singly. This is explained on the ground that both fingers tend to move together as a result of the biologically important grasping reflex. When either is forced to tap alone, the other must needs be inhibited and this inhibition apparently is extended somewhat to the motor half center of the first finger. When both fingers move simultaneously this inhibition is removed.

From experiments on javelin throwing Murphy (8) concludes that "learning periods can be distributed by giving alternate days practise and even weekly practise without any loss in learning." He goes farther and suggests that "better work, for the amount of time expended, can be done in our schools through a distribution of three times per week than through a distribution of five times per week." Bradford's (1) study of the learning of typewriting confirms in many ways earlier work, such as that of Book on the learning process, and of Starch and Pyle on the effect of various intervals of work and rest.

A somewhat different phase of the problem of fatigue and work is presented by Huntington (4) and Woodruff (12). Both these writers call attention to the influence of climate on man's industry and culture. The former has gathered together data concerning the wages of men and women employees in Connecticut, Pennsylvania, North Carolina, South Carolina, Georgia, and Florida; concerning the death-rate in New York state; the gain in weight of tubercular patients; grades of students at Annapolis; etc. From a study of these data he concludes that "the best climate would be one in which the mean temperature never falls below the mental optimum of 38 degrees or rises above the physical optimum of 60 degrees, or possibly 65 degrees. The second most important factor next to temperature is change of temperature from day to day. Regions within the cyclonic storm area are thus favored over those not so situated. On the basis of such figures he constructs a map of the world showing favorable and unfavorable climate to man. This map agrees surprisingly well with another showing degrees of civilization based on a sort of "order of merit" questionnaire from 54 leading geographers. The last third of the book is devoted to an explanation of the rise and fall of civilization on the basis of fluctuations in the climate of the earth. Woodruff's work is devoted, on the other hand, more particularly to the effect of various ether waves, such as ultra-violet, etc., on man. He makes much of the presence or absence of pigmentation in the skin of man as indicative of adaptation to different climates. The blond type is superior intellectually to all others, but can never become acclimated to hot areas (meaning high intensities of light). Brunettes, on the contrary, do not do well in cold, cloudy regions.

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PSYCHOLOGICAL EFFECTS OF DRUGS

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The drug experiments of most interest to psychologists are those done by Dodge and Benedict (2, 3) on the psychological effects of alcohol, both on account of the results reported and the technique developed. Special reviews of this work appear elsewhere. Lange and Sprecht (7) have continued earlier work upon the influence of small doses of alcohol upon the senses. They had formerly found that the stimulus threshold of the auditory mechanism was lowered by small doses of alcohol, while the difference threshold was raised. They now report substantially the same for the sense of vision. The threshold for visual stimuli is lowered and the difference threshold increased by small doses. Variations in the size of the dose cause only a quantitative change in the threshold. Great individual differences appear depending upon the degree to which the subjects are accustomed to the use of alcohol. No reaction appeared at any time after the dose, such as to raise the stimulus threshold above the normal or lower the difference threshold below the normal; there was merely a gradual return to the normal. The authors venture the opinion that these effects of alcohol will be found common to all senses.

Jörger (6) studied the effect of alcohol poisoning upon the association processes, attempting to establish an association type for alcoholics, very much as has been done for imbeciles, epileptics and the like. The association records of the alcoholics were compared with the norms of Jung and Riklin. Experiments were conducted in the ordinary fashion, with a first repetition of the test after ten minutes as a test of reproduction, and later repetitions during recovery from the effects of alcohol. The results show that alcohol poisoning produces a lengthening of the reaction time, a tendency to repeat the stimulus word or the previous reaction word, an increased number of personal reactions, reduced number of *sprachlich-motorisch* associations, an increase in the number of nonsense reactions and perseverations, poor reproduction after ten minutes, a tendency to sentence responses and an increase in the number of sound associations. Arlitt (1) determined the effect of large doses of alcohol upon the intelligence of the white rat, as indicated by the speed of learning a maze. Rats fed alcohol averaged a longer time in the maze and made more errors both at the beginning and during the latter part of the training period, than normal rats.

Porter (11) used the Martin method of measuring faradic stimuli to determine the threshold of the flexion and extension reflexes in the cat, as affected by strychnine. A 0.1 solution of strychnine sulphate was injected into the jugular vein. Out of 15 tests, nine showed a lowering of the thresholds of 8 to 98 per cent. In the other 6 cases, all of which were flexion reflexes, no lowering of the threshold was detected. Porter found, however, that if the flexion reflex was previously raised by drugs or otherwise, then strychnine caused a lowering of the threshold. The interpretation of these results is that strychnine will produce a state of maximum excitability in any reflex, but some reflexes are normally nearer this maximum or, as in the case of some of the flexion reflexes, are normally in a state of maximum excitability. In the latter case strychnine could produce no change. Strychnine has a tendency to bring all of the reflexes to the same maximum speed. The great excitability of the flexion reflex mechanism approaching the maximum is probably due to the fact that this is a protection reflex, very frequently used, and one which to be of service must be set on a hair trigger. Lashley (8) measured the effect in the albino rat of caffeine and strychnine upon the rate of learning the maze. Comparison with the performance of normal rats indicated that strychnine in large doses facilitates learning, while caffeine retards learning. Retention, on the other hand, seemed unaffected by either drug. In no case were serious after effects noted.

Dongen (4) found that the nerve centers differ in the extent to which and the speed with which they become adapted to morphine. The breathing center may become adapted to 1,800 times the initial dose, while the vagus center is not adaptable. Adaptation is due not only to a destruction of the poison within the body, but a special immunity develops against it in certain centers. Jones (5) studied 41 cases of drug addiction, as to occupation, status in society, drug used, how the habit was formed, etc., and found interesting differences. He concludes that drug taking is a cause of insanity, and forms a great public danger. Macht, Herman and Levy (9) made a quantitative study of the effect upon the pain sense of various opium derivatives. Among other facts, they found that morphine is the most powerful analgesic of this group. Interesting individual differences were noted. All tests were made upon individual pain spots with an electric stimulus, and a striking constancy of the pain threshold was observed during several hours, together with a high sensitivity to slight changes in current strength in normal or control subjects.

McCord (10) fed pineal gland tissue to chickens, dogs and guinea pigs, and noted the change in development as compared with the growth of control animals. He found increased weight, increase in development of the sex functions, and in the case of dogs, an increase in mental development, the last being indicated by earlier ability to lap milk, to respond to a call and to find their way back to the kennel. These are the same symptoms that appear in some cases of pineal tumor, where the tumor growth probably retains the function of the gland.

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SPECIAL REVIEWS

The Influence of Joy. G. V. N. Dearborn. Boston: Little, Brown, 1916. Pp. xviii + 223.

The editor of the Mind and Health series in which this little book appears speaks of it in his introduction as "a well-proportioned comprehensive survey of the work done by all who have shared in the task of scientifically studying the effects of emotional states on the organs and processes of the body." It is no such thing. The author more modestly and truthfully describes it as "an essay intended to set forth some of the hygienic and therapeutic sanctions of organic happiness." This he proceeds to do *con amore* with no very great regard to precision of style and with an exuberance of cheerfulness inseparable perhaps from the subject. As the book is meant to be popular and, in particular, practical, it calls for no extended notice here. It is divided into two parts, the first treating of the Power of Joy, the second of its Necessity. It is in the former that a report is made of some of the work in recent years on the connection of emotional states with nutrition, circulation, the nervous system, etc. We are assured that gladness as an effective agent in behavior is eminently easy of cultivation, but little specific direction is given as to either its cultivation or its sources, and, strangely enough, the word laughter is not found in the index. The most psychological of the chapters is the first, but that is disappointing. To take a single instance. On p. 23 we learn that both autonomic and cerebro-spinal influences are concerned in the bodily phases of emotion and that the total effect is perhaps change in every organ and in every part of almost every tissue of the body; the opinion, therefore, is not unreasonably expressed, that it is the indefinite number of combinations possible between these physiological elements which accounts for the complexity of emotional expressions and their variety. This, vague and general though it is, is probably correct. But on p. 20, obsessed by the importance of "kinesthesia," the more specific doctrine is asserted, that the variety of affective experiences is due to the group-uniqueness of the "joint-muscle" sensations. We have to bear in mind that the author is an adherent of what he calls the "James-Lange-Sergi" theory. On the whole the reader will perhaps be disposed to agree with the author's own estimate of the scientific interest of the book, namely that it is "narrow and problematic" (p. 218).

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A Beginner's Psychology. E. B. TITCHENER. New York: Macmillan, 1915. Pp. xvi + 362.

This latest text-book of Titchener supplants the old *Primer*, but it has been so thoroughly rewritten that it cannot properly be called a revision. It is, in fact, a new book and one written in Titchener's best style. In reading it one feels that the author has thoroughly enjoyed his task. He has written it as he would speak to his class and one is inspired by his enthusiasm and stimulated by his personality, for it is, every line of it, thoroughly Titchener. Throughout there is the aim toward simplicity and clearness without sacrifice to truth. The style of the book, though to some extent conversational, is dignified, for the desire to interest never encroaches upon the serious treatment of the facts.

The student is never left long with abstractions. Wherever possible concrete illustrations are introduced from personal experiences, from readily imagined situations and from good, modern literature such as the writings of J. M. Barry and Lafcadio Hearn. As an example of his style we may quote from his chapter on "Action," p. 234: "Now for the illustration! Suppose that, as I am writing this paragraph, it occurs to me to look up a reference, for quotation, in a particular book that stands on the shelf by my side. I turn toward the shelf, recognize the book, take it in my hand and turn the pages, and presently find the passage I had in mind to use, etc."

Important facts are so embodied in the text that the student should remember them without conscious effort. Theory is not introduced until sufficient and yet not a confusing number of facts have been presented to form a background for a complete understanding. It seems to the reviewer that pedagogically the plan of this book is far superior to a perhaps more systematic one where the text is broken into short paragraphs with large headings, where definitions abound and each set of facts is rigidly classified. The student, in such cases, feels everywhere the one command "memorize" and when he has finished he has a storehouse of words without love or meaning.

Titchener has always considered it wise, even in an elementary text-book, to give the students the pros and cons of a theory and to avoid as far as possible dogmatic statements when the subject is still in doubt. He finds, for instance, that Cannon's work on the emotions supports his objections to the James-Lange Theory. He cannot regard the "organic commotion" as sufficiently differentiated to distinguish any particular emotion from the rest. He adds: "From an æsthetic point of view we may regret this conclusion; it is always more satisfactory to end up a discussion with some positive, clean-cut statement than to leave the subject with a 'safe' generalization and a balanced judgment; but when we are seeking scientific truth, we may not outrun the facts we have; and when a science is in the making, the facts will not often round off prettily into a comprehensive theory" (p. 222).

The student is referred to a good physiology for a knowledge of the central nervous system. The physiological facts necessary for an understanding of the processes underlying the sensations are described in the most elementary manner, at times almost too picturesquely. At the end of each chapter is a long list of questions, many of which are very original and they should stimulate the student to independent thought and investigation. In the text there are frequent references to previous statements, which method will aid the students to knit the separate facts into a comprehensive system.

The author lays his principal emphasis upon inducing the student to assume the proper psychological attitude toward the various problems rather than to the amassing of facts. Owing to the confusion which one finds continually in the psychological literature, the point most persistently insisted upon is an avoidance of the stimulus error or more broadly stated, a proper psychological attitude toward "meaning." A clear understanding of the psychological problem of meaning will help the student for all time to keep his psychology free from epistemological, philosophical and ethical considerations.

Psychologists are familiar with Titchener's methods and views from his *Text-book*, but that book was written some six years ago and his opinion on a number of subjects has been changed by the results of recent investigation as well as by important developments in his own manner of thinking. Introspective facts, of course, form the foundation of his deductions, but the word "introspection" has led to so many misunderstandings that he hopes the time will soon be ripe when he can cease to use it. The term "consciousness" has so many meanings that he no longer uses it in this book. We find in the preface: "Experimental psychology made a serious effort to give it a scientific meaning; but the attempt failed; the word is too slippery, and so is better discarded."

The author continues to rule out the subconscious from the science as an aid to truth, for the reason that it is unnecessary and dangerous, yet he adds in all fairness that the concept has proven useful in the field of psychiatry and psychotherapeutics. In its stead we find throughout the book an explanation of subconscious processes in terms of nervous set and disposition, as for instance when the recent work of Wertheimer and others on the stroboscopic effect is discussed. Here we have the "perception of movement in terms of sheer brain-habit, of a settled nervous disposition that now has no mental correlate" (pp. 133–134). The "determining tendency" is also referred to unconscious cerebration. This concept of a determining or guiding tendency is becoming of great importance to many psychologists and finds more mention than in the *Text-book*. Through it we get away from an explanation of the thought processes by the old mechanical notion of the association of ideas, which seemed so satisfactory, but which, in reality, was so fallacious.

A new and interesting development is the relation of attention to memory, imagination and the thought processes. The term memory is restricted to the revival of those experiences which are recognized. Recognition requires a feeling of familiarity which is a "sense feeling of the agreeable and relaxing type" (p. 178). Memory may occur either under primary or secondary attention. Under the first form it is remembrance; under the second, recollection. Likewise imagination may occur in either state of attention. When under primary attention it is receptive imagination, the imagination necessary to full comprehension, whether of a scientific discussion or a work of art. When under secondary attention it is constructive or creative imagination. "Thought goes on in the state of secondary attention; it is an experience of the same general type as recollection, constructive imagination, selective and volitional action" (p. 262).

There is an entire chapter devoted to "Sentiment," which denotes as used in this context "the feeling-complex which gathers about a judgment or an imaginative construction" (p. 290). Under this head are treated the intellectual, moral, religious and æsthetic attitudes.

A short appendix is devoted to dreams and hypnosis. The dream pattern is described and the Freudian theory of an underlying wish is criticized for its claim to a wider application than the facts warrant.

The book should prove of great value in an elementary course.

It is much better for the beginner than was the *Text-book* and should awaken in him a real interest and enthusiasm for the science as well as give him a sound foundation upon which to build. It is also, judging from its simplicity of style, one of the few text-books which can be recommended to the layman who desires an honest knowledge of the necessary facts of psychology.

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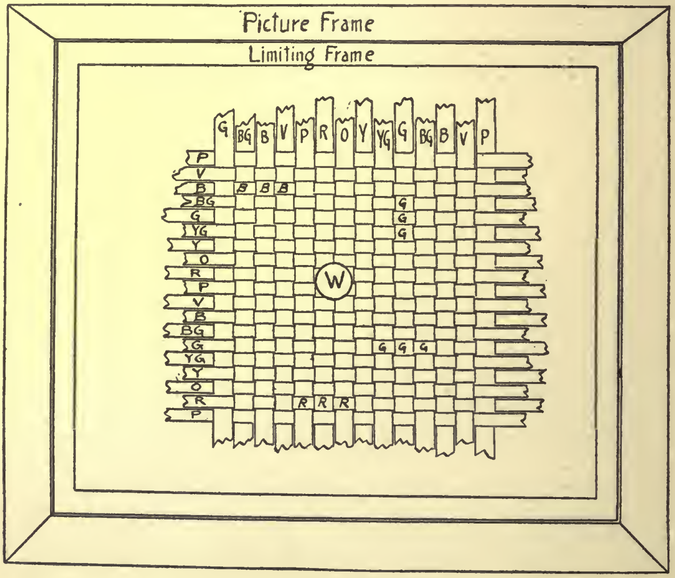
DISCUSSIONS

PURKINJE DEMONSTRATION

A rather striking and simple demonstration of the Purkinje phenomenon, and that foveal vision is less acute in twilight than in daylight, can be made from a picture frame and the colored papers which are available in psychological laboratories.

The demonstration is based upon the principle that if foveal vision is less acute in twilight than in daylight, an area made up of small colored squares arranged into some regular form of checkerboard pattern, will show the pattern less distinct in foveal vision than in peripheral vision when observed under twilight conditions.


Picture Frame
Limiting Frame
G BG B V P R O Y YG G BG B V P
P V B BG G YG Y O R P V B BG G YG Y O R P
B B B
G G G
W
G G G
R R R

Again, if the rods are absent in the fovea we should expect that a small white area (*W* in the illustration) which is distinctly visible in foveal vision in daylight, would, in twilight, disappear when fixated directly, but would again reappear when the fixation point is displaced to one side of *W*.

The mat which is here described and which is shown in the above illustration demonstrates both these points quite clearly. For protection and easy manipulation the mat was placed in an old picture frame which held a glass 20 x 24 inches. On a black background of cardboard the mat was woven from strips cut from sheets of Milton-Bradley colored papers, the size of a full sheet being 20½ x 24½ inches. The colors used were red, orange, yellow, yellow-green, green, blue-green, blue, violet, purple, arranged to conform to their approximate positions in the spectrum. The colors were repeated in this order until the required width and length were covered. Any other colors arranged in any other order may of course be used, depending upon what particular pattern it is desirable to obtain.

For the long way the colored strips were ½ inch wide and for the short way ¾ inch. The two sets of strips were then interwoven as shown in the illustration until the whole area of 20 x 24 inches was covered. This is a simple process if one begins in the center and works in both directions. When the weaving is completed the resultant mat will seem to be composed of many squares of different colors. In order to hide the ragged edges of the colored papers, a limiting strip, 1 inch wide, was cut from black cardboard and placed over the edges of the mat. This left the exposed area 18 x 22 inches when in the frame and covered with the glass. The squares of color are ½ x ¾ inches in size but at regular intervals three squares of the same color fall adjacent to each other and form an oblong as indicated by *B B B*, *G G G*, *R R R*. This helps to give the colors a definite pattern and avoids the confusion which might otherwise become a "riot of color." In the center of the mat is pasted a circle (*W*) 1½ inch diameter cut from pure white paper.

The mat here described is for observation distances of from five to ten feet. Where the mat is to be used to demonstrate to a large class in a large room that can be darkened to the proper degree, the paper strips should be wider, say 1 to 1½ inch, and the whole mat larger, perhaps 3 to 4 feet square.

For demonstrating to a small class the mat is taken into the dark room, placed against the wall so the light from the door will fall directly upon it. The students arrange themselves around the mat at a distance of 6 to 8 feet. At first the door is kept entirely closed for 3 to 4 minutes in order to hasten the dark adaptation. Then it is opened slightly so the mat is just visible. When the degree of adaptation and illumination is such that it is just impossible to distinguish the colors, the following points may be demonstrated:

1. The small white circle (*W*) is invisible when fixated directly, but is clearly visible when any point on the frame of the mat is fixated.

2. When *W* is fixated the patterns immediately adjacent are less clear in brightness and outline than similar patterns lying nearer the periphery.

3. The foveal area tends to be filled in by imagery of the surrounding surfaces. It is only after attention has been directed to the fact that it is observed that the pattern covering the foveal area is less distinct than the peripheral areas. In this respect the demonstration gives an indication of how the blind spot of the retina is filled by imagery in daylight vision.

4. The pattern of the entire mat will have changed to a striped effect whereas in daylight the patterns will appear quadrilateral in character and much less definite.

5. When the illumination is increased so that the colors appear, but the outlines of the pieces are not yet clearly defined, the relief effect of the colors is very pronounced. The mat will appear to be made of mosaics which seem to be at different distances. Where the observer does not know that the surface is actually flat this relief effect is of course much more vivid.

The mat is also useful for class demonstrations in the perceptual processes. By changes in the direction of attention the colored squares can be grouped into a large number of different patterns. For those persons whose affective life is influenced by color tones this mat presents possibilities of affective experience hardly realized by the most ambitious cubist paintings.

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ON THE COMPUTATION OF THE STANDARD DEVIATION

The method of computing the standard deviation which will be described here is so simple, and is so direct an application of the common *Short-Cut* method that it seems unlikely the method has not been suggested before. A survey of the manuals on statistical methods has led the writer to believe that the procedure to be described is not widely used, although attention may have been previously called to it. That the method is of great value is shown by the fact that the labor of computing the standard deviation becomes far less than that of computing the average deviation.

Any deviation is equal to the score minus the arithmetic mean. That is,

$$d = x - M,$$

$$x = d + M,$$

$$x^2 = d^2 + 2dM + M^2.$$

Now sum for all cases.

$$S(x^2) = S(d^2 + 2dM + M^2)$$

$$= S(d^2) + 2M \cdot S(d) + nM^2.$$

Since deviations are measured from the arithmetic mean,

$$S(d) = 0$$

and therefore

$$S(x^2) = S(d^2) + nM^2.$$

Divide by n

$$\frac{S(x^2)}{n} = \frac{S(d^2)}{n} + M^2.$$

Since $[S(d^2)]/n$ = standard deviation squared, the square of the standard deviation equals (sum of the scores squared)/n *minus* the square of the arithmetic mean.

In actual work, if an adding machine that will carry two columns of figures is used, the following procedure is suggested.

Print in the first column the score and in the second column the square of the score. Thus

	5	25
	6	36
	2	4
	8	64
	7	49
Sum	28	178
Average	5.6	35.6
Subtract M^2		31.36

4.24 which is the standard deviation squared.

Extract the square root

2.05 which is the standard deviation.

This method has two advantages over the common method of computation. (1) It is unnecessary to make a subtraction for each score. (2) The standard deviation may be found correct to any desired number of decimal places, simply by carrying the average to that number of places.

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NOTES AND NEWS

THE PSYCHOLOGICAL REVIEW PUBLICATIONS have most unexpectedly become involved in the war. The American Consul General in London reported that a package of books by German authors sent us for review had been seized by the British government. We wrote explaining the harmless character of the books and suggested that any psychologist in Great Britain would corroborate this testimony after being informed of the authors and titles. The British Procurator General has finally decided that such publications are not entitled to free transit. The editors will not contest this decision in court. We shall, however, endeavor to give our readers as full, impartial, and untainted a review of psychological progress as is possible under existing conditions.

DR. ERICH BECHER has been elected as successor to the late Professor Külpe at the University of Munich. Becher has been *ordinarius* at Münster since 1909, and among other writings has issued a volume on "*Gehirn und Seele.*"

W. H. NORCROSS, of Johns Hopkins University, has been appointed associate professor of psychology, philosophy, and education, in Dickinson College.

MR. BENJAMIN KIDD, author of Social Evolution and other publications dealing with social philosophy, died on October 2, aged 58 years.

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THE

PSYCHOLOGICAL BULLETIN

GENERAL REVIEWS AND SUMMARIES

SOCIAL PSYCHOLOGY

BY CHARLES A. ELLWOOD

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Objectivism is scarcely yet in serious evidence in the literature of social psychology. But the signs are abundant that it soon may be. Frequent references to objective methods are to be found in the recent books, and at least one notable article has set forth the thesis that the only possible scientific social psychology must be a social physiology.[1] But the complexity and evidently ideational character of the behavior of human groups has thus far deterred anyone from attempting to carry out a complete objectivism in their scientific description. The writer has elsewhere set forth in detail a general criticism of this whole movement.[2]

Four notable books have been added to the general literature of social psychology in 1915–16; namely, Keller's *Societal Evolution* (8); Bristol's *Social Adaptation* (2); Trotter's *Instincts of the Herd in Peace and War* (9); and Schaub's translation of Wundt's *Elements of Folk Psychology* (12).

Professor Keller inquires (8) how far rationally planned changes, or adaptations, are possible in human society. He bases himself upon the general principles of the Darwinian theory of evolution, and to this extent his point of view may be said to be biological and objective. But he clearly recognizes that human adaptation is typically mental and social rather than physical, and that "societal" evolution is distinct from organic evolution. "If we wish to get down to fundamentals," he says, "and so arrive at the hidden springs of societal life and evolution, we must seek them in the societal conventions and in public opinion." Human societal evolution is synonymous with the evolution of civilization, and civilization is measured by the quantity and quality of a people's realized ideas. But this societal evolution, Professor Keller rightly says, goes on within the general framework of organic evolution. There is variation in the organization and behavior of groups, transmission of social habits or conventions from generation to generation, and finally selection and elimination of groups. If one group happens to have superior "folkways" to another group, it is selected and survives. But all this is natural (or automatic), not rational, selection. Is there any room for rational selection of "folkways" and "mores," Professor Keller asks. Without going into his interesting argument, it will suffice to state his conclusion that there is hope of rational selection and adaptation in societal evolution only where the mores touch the hard facts of life, the physical conditions connected with the maintenance of the group. Rational selection here has a chance, because there is an objective standard by which to test the adaptation; and the rational modification of the "maintenance mores" will gradually modify all the other mores of a group; but there is little ground for believing in the possibility of directly modifying in a rationalistic way mores which are not in contact with the material means of existence.

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[1] Zeliony, "Über die zukünftige Soziophysiologie," *Arch. für Rassen- und Gesellschafts-Biol.*, 9, 405–430.

[2] *Amer. J. of Sociol.*, November, 1916.

Thus Keller's conclusion is very similar to the "economic determinism" of Marx. Social improvement is possible only through changing the maintenance mores. Obviously, there is left out of consideration such historic facts as the rationalistic changes made in religion, in art, and even in forms of the family life without any corresponding change in the maintenance mores. Professor Keller finds a closer correlation between the different phases of societal life and evolution that what the facts of cultural anthropology and human history warrant. He neglects, moreover, to inquire whether there is any other way of testing the rationality of an adaptation than through the activities connected with food, clothing, shelter and self-protection. In fact, the whole book illustrates the need of an adequate psychological basis if we are to have a truly scientific sociology.

A book which errs in quite another direction is Mr. Trotter's *Instincts of the Herd in Peace and War* (9). The author in his introduction endorses a "thorough-going objectivism" in social psychology and sociology; but by this, he apparently means nothing more than a radical biological point of view in those sciences. For he does not hesitate to speak of ideas, emotions, feelings, and beliefs as all in their way playing a part as instruments in the social life. He regards sociology as essentially an "applied psychology," though he would include in sociology, apparently, a consideration of eugenics. The central thesis of the book is that the more fundamental social phenomena may be interpreted scientifically in terms of man's innate gregariousness. It is this which explains sympathy, suggestion, imitation, and group behavior in general. The thesis is very cleverly worked out though, as the author admits, in a highly speculative manner. Many things which he would explain by "herd instinct" might obviously be more satisfactorily explained through the working of tradition, custom, and even intelligence in the social life. Nevertheless, the point of view of the essay—in emphasizing the biological importance of gregariousness, the evolution of human nature under conditions of group life, and the consequent innate tendencies of man to react in certain ways to the stimuli coming from his group, or "herd"—is fundamentally sound. He shows quite conclusively that the psychological interpretation of the behavior of human groups must start with these biological, hereditary, or instinctive factors. It is to be regretted all the more, therefore, that he fails to recognize in any adequate way the even greater importance of acquired habits, of folkways, of traditions, of mores, in the behavior of civilized populations. It is even more to be regretted that the book appears, apparently to make it sell, as a "war book," and that the author seeks to find a difference between the "herd" instinct of the Germans and of the English. The former, like the wolf pack, show "aggressive gregariousness," the latter "socialized gregariousness." Such views so mar the value of the work that they will repel many readers. Nevertheless, the first two thirds of the book remain a valuable study of what we might call "foundations" in social psychology.

Of an altogether different character from either of the above works is Bristol's *Social Adaptation* (2). It is an historical study of the doctrine of adaptation in theories of social progress from Comte to recent writers. It is the most considerable history of the development of sociological thought which has yet appeared in English. While it deals with but one phase of social theory—the doctrine of social adaptation—that phase is so broad that it includes a considerable part of the whole history of recent social theories. Psychological social thinkers are adequately represented and dealt with; and the author's criticisms show a good equipment in, and appreciation of, modern psychology. His point of view, however, is philosophical, rather than strictly scientific; and for scientific purposes this impairs the value of some of his criticisms. The historical part of the work, though marred by some slight errors, is well done.

Professor Schaub has placed all English-speaking students of social psychology in his debt by his careful translation of Wundt's *Elements of Folk Psychology* (12). This work is not strictly speaking "social psychology" in the ordinary usage of that term (the psychological study of social life as it exists), and for this reason Professor Wundt rejected the term as a proper title for his book. It is rather, as its sub-title says, "a psychological history of the development of mankind." It is a condensation of the author's well-known *Völkerpsychologie* (the last volume of which in the second edition just appeared, by the way, in 1915). Unlike the preceding work, however, the *Elements* presents all the different phases of the mental social life as evolving synchronously, exhibiting their common conditions and their reciprocal relations. Thus the work becomes more nearly a cultural history of mankind on the mental side. Indeed, in English-speaking countries, much of the work would ordinarily be called "cultural anthropology," had not its distinguished author labelled it otherwise. That it exceeds the limits of anthropology as usually conceived, however, is shown by its division of the history of mankind into four fundamental ages: (1) the age of primitive man; (2) the totemic age; (3) the age of heroes and gods; (4) the age of humanity, into which we are just entering. It comes nearer being, therefore, a cultural and psychological basis for a philosophy of history, and this its author recognizes. The book in its 532 pages is a mine of facts and ideas; but one misses in it a number of distinctly modern notes, which fact shows that its distinguished author belongs to a generation now passing. For in this "psychological history of mankind" but little use is made of the influence of biological, geographical, or even economic conditions. It stands almost in antithesis with modern objectivism.

A good example of recent anthropological method in inquiring into the origins of institutions is Professor Hutton Webster's *Rest Days* (10). His method is objective without objectivism, if one may be allowed to speak thus paradoxically. The whole range of facts regarding rest days in ethnography and history is carefully surveyed, and "rest days" are shown to rest upon certain superstitious beliefs, which in turn are carefully correlated by the author with the life of the people.

Among the minor books of the year must be mentioned especially Burgess's *Function of Socialization in Social Evolution* (3). This is an expanded doctor's dissertation of more than ordinary value. The author shows clear comprehension of the psychological principles involved in socialization and synthetic ability of no mean order.

Professor Gault (6) defines social psychology as the science of "social behavior." Social behavior includes not only the conscious adjustments that occur among individuals, but also automatic or relatively automatic adjustments among them—"social habits." Social psychology deals with the development of these social automatisms, whether consciousness comes in or not. There is little fault to find with this broad conception of social psychology, provided that one recognizes that "social behavior" includes most of the subject matter of the social sciences. But later in his paper the author is not clear as to whether social psychology includes the study of all social organization, social unity, social continuity, and social evolution from the psychological point of view, or not. Thus he speaks of social psychology studying "the sense of social unity," but fails to say that it also studies "social unity" as an objective fact. But according to Professor Gault's definition, is it not just as much interested in the latter as in the former?

Miss Clark's paper on "The Crowd" (4) adds little to the voluminous literature on the subject. It does, however, rightly emphasize that the whole matter of crowd behavior is still in need of careful investigation, and that even laboratory experiments may possibly throw some light on the matter.

On the other hand, Mr. Woolbert's paper on "The Audience" (11) is a real contribution to social psychology, perhaps because so little has been written along this line. It is a careful piece of psychological analysis, and will well repay reading by all interested in social psychology.

A number of texts in sociology published during the year also contain much of interest to the social psychologist. Among the best of these are Hayes's *Introduction to the Study of Sociology* (5) and Blackmar and Gillin's *Outlines of Sociology* (1). Professor Gillette's primer on *Sociology* (7) presents a valuable, though fragmentary, outline of theory. On the whole, the year has witnessed decided advance in the study of the social mental life.

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CRIME AND SOCIAL PSYCHOLOGY

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Honesty (18) is an exposition of the complex factors which bring about dishonest conduct. The book has value for all who are concerned in the discipline and development of children, whether they are teachers, parents, or social workers. Dr. Healy's general discussions of home conditions, parental behavior, age of moral development, companionship, discipline, amusement, mental, physical, and social habits, physical conditions, abnormal mentality, impulsions and obsessions, together with his accounts of cases that have come to his attention and his general and particular recommendation as to treatment furnish principles and methods of diagnosis and treatment which the educator can easily adapt to any particular problem of dishonesty.

Pathological Lying, Accusation, and Swindling (17) is also a study in the motivation of conduct. Pathological lying is defined as a "falsification entirely disproportionate to any discernible end in view, engaged in by a person, who at the time of observation, cannot definitely be declared insane, feeble-minded, or epileptic. Such lying rarely, if ever, centers about a single event; although exhibited in very occasional cases for a short time, it manifests itself commonly over a period of years or even a life time. It represents a trait rather than an episode." Pathological accusation also is indulged in apart from any obvious purpose; and pathological swindling is but a natural evolution of the general tendency towards pathological lying. The book gives a review of previous studies of these subjects, a consideration of several cases of such lying, accusation, and swindling as have been under the observation of the authors, and finally a statement of the correlations between such conditions and other aberrational states, such as constitutional inferiority, chorea, hysteria, epilepsy and inherited instabilities.

The Criminal Imbecile (16) gives a detailed account of three imbecile murderers. The book is exceedingly valuable as an analysis of the emotions and acts of this type of criminal, and as an argument for a change in the legal attitude towards criminal responsibility. Goddard argues that the laws should provide for a verdict of not guilty on account of feeble-mindedness; he also argues that the courts should employ as experts not the ordinary practising physician, but the physician who has acquired an understanding of the feeble-minded by daily contact with them in institutional life.

The Jukes in 1915 (12) continues the study of the criminal and degenerate family of Jukes from the time of Dugdale's publication concerning them. It is chiefly valuable for its many carefully prepared and comprehensive charts and statistical tables showing the relations of crimes, alcoholism, diseases, consanguineous marriages, changes of environment, matings with good stock, feeble-mindedness and the like.

The thesis of *Criminality and Economic Conditions* (5) is that economic conditions, especially the present system of capitalism, are the source of all crimes; and it proposes as a remedy for criminality the system of community of the means of production.

Many articles have been written during the past year arguing against trying the accused on purely legal grounds. On the ground that the offender, because of drug or drink habits, of mental or physical defects, or of bad environment, has a more or less uncontrollable will, they make a plea for the establishment of laboratories in our courts with medical, psychological, and sociological departments. The solution of the criminal problems is thus made to depend upon the treatment of the individual delinquent rather than upon punishment for the crime committed. Thus Spaulding (28) writes that the majority of cases of delinquency require treatment founded on a diagnosis made by the doctor, the psychologist, the psychiatrist, and the sociologist. This necessitates a court laboratory. The diagnosis would reveal those who require permanent segregation; those, suitable to a truly indeterminate sentence, who require partial segregation; and those who are suitable for parole. Of course this diagnosis can be acted upon only if the state makes adequate provision for the permanent custody of all committed cases of mental defect whether or not they have a court record.

Knapp (21) criticizes the legal method of judging criminal responsibility on the basis of past judicial decisions as precedents rather than on the criminal's power to control his actions. He attacks also the legal procedure which does not permit the medical expert to give a frank opinion or tell the whole truth, but allows him only to answer such specious and confusing questions as the lawyers may ask him; and which permits an influenced or prejudiced jury to decide upon the defendant's responsibility. He advocates that every delinquent be examined by competent experts who should decide upon his degree of mental defect and his accountability. According to the examination, the delinquent could be put under life-long supervision or under more or less temporary supervision; or could be put to work under an efficiently restraining guidance to keep him from being a social menace. Bisch (3) emphasises the value of examining the delinquent before arraignment as shown by the workings of the police psychopathic laborary which has been established in New York City. Yerkes (32) and Davis (11) also emphasise the need of such mental examination of police and court cases.

Another numerous group of articles deal with the methods of testing and judging criminal responsibility. Anderson (2) emphasizes the need of a classification of borderline mental cases among offenders. Wallin (29, 30) and Kohs (23, 24) in a series of articles hold a controversy as to the value of the tests for the ten, eleven, and twelve year levels, Wallin criticizing and Kohs defending. Directly and indirectly both writers show the present need of analyzing the delinquent sociologically, economically, and medically, as well as psychologically. Rossy (27), Yerkes (32), Healy (19) and Bronner (7) also argue that diagnostic statements of the responsibility of the criminal should be formulated on the basis not only of mental tests but of a consideration of the family history and the environmental history of the individual. Both Rossy and Yerkes find the point scale a better method of estimation than the method of the Binet-Simon System. Yerkes also makes a plea for experimental work to discover adequate tests for measuring instinctive and affective processes as well as tests for intelligence. Cope (9) compares the Binet-Simon and other tests and concludes that the point scale system is going to give us better standardizations than the revisions of the Binet scale.

It is urged that the treatment of prisoners be based, as mentioned above, upon the diagnosis obtained in the laboratories established in the courts. Such analyses will reveal those delinquents who on account of the degree of their mental defect, physical incapacity, or addiction to a drug or to alcohol need more or less permanent custodial care, and hospital treatment, and those who need greater or less educational guidance and moral supervision at work. Such treatment demands the truly indeterminate sentence, adequate probational and parole supervision, sufficient custodials for the mentally defective and hospitals for the alcoholics. Criminologists who urge these principles and equipments for the classification and treatment of offenders are Abbott (1) Davis (11), Folks (14), Kilbride (20), Cross (10) and others. Folks recommends that probation officers be appointed from civil service examination; that an adequate number be employed; that adequate salaries be paid, so that good officers may be secured; and that the work of the probation officers in the larger courts be systematized. Davis (11) in addition urges a proper method of choosing those who are to be put on probation. It is generally agreed that first, accidental, and young offenders should be so chosen; but they should all also be physically fit and trained to earn their own living, be able to find work, should be in a good home, and should be mentally sound. These considerations should also determine those who should be paroled.

Blackwood (4) shows by statistics that the belief in liquor drinking as the chief cause of crime is a fallacy; that it is lack of self-control and moral character which leads to excesses in both drink and crime; and that, therefore, the treatment of the alcoholic should be prescribed on that fact as a basis. Judge and juries should not condone the delinquency of the alcoholic on the ground that he was temporarily irresponsible; but they should recognize that his drunken condition was itself due to chronic irresponsibility which makes him a menace; and should order for him hospital and custodial treatment.

Literature of the past year is teeming with accounts of new systems of prison discipline in which self-government and honor systems, outdoor work, and compensation are the chief features. Davis (11) compares the self-government system of Osborne, in which the men have a very large measure of control; the method at Bedford Reformatory, where promotion and the degree of self-government are based on evidence of effort and self-control; and the method at Great Meadow Prison and at Warden Gilmour's prison in Ontario, where there is association of the inmates in play and work under supervision. White (31) recommends the Mutual Welfare League of Sing-Sing as an efficient means of prison discipline and as an effective agency for calling out a sense of responsibility.

Potter (26) gives statistics to show that fines are a failure as a deterrent, either because they are too small, or because they are less than the amount gained by the lawbreaking. He points out also that, since the deterrent effect of any punishment depends upon a controllable will, fines are of little or of no use in the group of offenders having confirmed delinquency tendencies due to the liquor, the drug, or the gambling habit, or to mental defect. As a reformative influence, they are a failure, because they cannot change desires, abilities, or environments. However, if the amounts of the fines are adjusted to the means of the offender, they may prevent the repetition of minor and technical offenses. They may also act as a deterrent if execution of them is suspended during good behavior. Borchard (6) urges legal provision for compensation for the injustice done by conviction of the innocent.

Kneeland (22), considering the loss of control over sex impulses caused by alcohol, shows, that, if any progress is to be made towards eliminating prostitution, the sale of alcohol and commercialized prostitution must be absolutely divorced by law and efficient administration of the law. Fosdick (5) asserts that it is a mistaken theory which holds that prostitution is a police problem. He argues that the control of prostitution is not so much a matter of law and the execution of law as it is a social problem. The regulatory principle is a failure; but the "red light districts" can be abolished only by persistent opposing public opinion. Both Fosdick and Flexner

(13) assert that the elimination of this vice depends upon thoroughgoing and comprehensive measures of social amelioration. Carstens (8) finds that the prosecution of a sex offense has a very hardening effect upon the girl who has to tell her story separately to the District Attorney, the local Justice, the grand jurors, and the judge and the petit jurors at the trial. He recommends that the procedure be reformed so that the story need be told by the girl but once and so that women deal with her. Miner (25) also shows that the problem of prostitution is not so much a matter of making and enforcing better laws as it is a problem of prevention through moral education and improved economic and social conditions.

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APPLIED ASPECTS OF SOCIAL PSYCHOLOGY

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The most elaborate work of the year is that of Gowin (1). He proposes to apply the principles of social psychology to the concrete problems of the executive. His interest is chiefly in the executive's management of men in large business concerns, though he has in mind also the management of groups as different as churches and political parties. Professing a distaste for *a priori* conclusions in such matters, he attempts to be inductive as far as possible. He presents interesting charts based upon original data to show that executives in many lines investigated are both taller and heavier than those whom they control. Occasionally his conclusions are supported by the current practice of successful business executives, though more often they are illustrated by extracts taken from the biographies of great leaders of the most varied types. Gowin begins by asserting that the really "practical" man is he who gets results, but insists that this can only be accomplished by intelligent handling of the psychological factors. The springs of action of the men under the executive lie in the instincts listed by McDougall. Some executives control directly by virtue of a strong personality which induces fear, subjection, wonder, admiration, awe, reverence, sympathy, or love in those under them. The power of the executive to stimulate imitation depends upon prestige. This latter may result from his position, wealth, success, or merely the idealizing tendency of the group under him. There is a strong chapter on the stimulating power of emulation among employees and a somewhat cynical one on the "befuddlement" of reason, as he expresses it. The effectiveness of discipline is found in the definiteness of reward and punishment, their promptness and certainty. Moreover the natural idealism of men may be easily exploited by vigorously exalting and idealizing the nature of the work which they are performing.

Tanner (2) and Taussig (3) both discuss the social aspects of the psychology of invention. Miss Tanner concludes that the ability required to make an invention has slight relation to its social value. She contrasts from this point of view the work of Guttenberg and Watt. The interaction of society and invention are traced through that remarkable series of inventions concerned in the rise of the textile industry—the spinning jenny calling forth the cotton gin on the one hand, and the power loom on the other, and these in turn the sewing machine. In each case there was a great social need for the invention, of which the inventor was keenly conscious. Despite this, the introduction of the machinery usually met with most violent social opposition and, when once introduced, the inventors had to fight with the greatest stubbornness to secure even a part of the profits lawfully due them. Society rewarded none of them in proportion to the value it received from them. She finds, as does Taussig, that the typical inventor really needs a business partner to guide and steady his activities so as to secure the maximum benefit to society as well as to himself. It is also thought possible that the naturally frail physique of Howe and of Watt (who is considered at some length) may have had some tendency to stimulate their inventive activity.

Taussig's book is fundamentally a thoughtful discussion of the social aspects of the tendency to contrivance, especially as to its adaptability to the systems of individualism and collectivism, respectively. Contrivance is held to be a specific tendency or instinct because inventors seem to invent useless things as well as the useful, for the mere satisfaction of the activity itself. All inventors have, however, been guided toward the socially useful and, to a very considerable extent, by the hope of gain. The instinct of contrivance is also manifested in the business man in the management of his business, though the modern factory system very largely suppresses the tendency to contrivance among the workmen. This suppression is thought to play a great part in their discontent as well as to hamper socially useful invention. In addition, the business man is held to be motivated by the tendency to acquisition, domination, emulation, and sympathy; the strongest of these being domination. Domination also largely moves the labor leader. But sympathy though weaker, is a very real force even in business. While it will never be dominant it may be expected to play a larger part as time goes on. Finally it is held that the existence of the various "instincts" discussed above, may not be incompatible with a possible socialistic regime.

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PSYCHOLOGY AND THE WAR

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Though much of the prolific literature called forth by the war is of little scientific worth, the social psychologist will find interesting material in at least a few contributions by recognized psychologists, physicians, and philosophers.

The question whether wars can be avoided in the future has prompted thoughtful analysis of the mental processes that give rise to war and of possible means for their suppression or control. Stratton (13) argues that though fighting is the expression of an instinct old in the race, the fact that this instinct has become disciplined to other modes of expression in relations between individuals, families, clans and cities, leads to the conclusion that the same is possible in relations between nations. Marshall (5) arrives at a similar conclusion, based upon a psychological theory of the nature of consciousness, a psychologico-ethical view of optimism and pessimism, and a metaphysical application of panpsychism, all of which argue that human creative intelligence can form and realize ideals of peace. Moore (8), in the course of a digest of the literature of the subject, gives an analysis of the instincts that occasion war, finds that they have been increasing in intensity with civilization, and concludes that the passing of war can only be hoped for when more becomes known of the successful sublimation of primitive instincts than is known at present. Conway (1) attributes warfare to the instinct of expansion possessed by all nations, and says that any one would occupy the entire earth except for the resistance of the others. Peace is due to an equilibrium effected by the mutual resistance of nations ("balance of power"); war is the result of a disturbance of this equilibrium. Crowds of pacifists exercise little influence in war time, and democratically governed nations are as much addicted to war as others. Wars are not caused by ideals, though a war becomes largely a conflict between ideals, and the latter may help determine the outcome. The only kind of force that could bring lasting peace to Europe would be the rise of an international "overcrowd" led by an overmastering ideal more potent with populations than any which single nations can exert. The Roman Empire and the mediaeval Church were imperfect approximations to such an "overcrowd." Messer (7) is more pessimistic. The numerous and bloody wars of the past century refute the doctrine of Comte and Spencer that wars tend to become impossible with increasing civilization. Hostile impulses are nourished in a nation during peace through economic competition, the *Börse*, duelling, rivalry between officials, teachers, scholars, artists, theologians, *et al.* When war is threatened the influence of those educated in science, philosophy, and art may be on the side of peace, but it is weak in opposition to rulers, politicians, diplomats, officers, journalists, and others who find war to their personal advantage. If a proposed war appears to be defensive, patriotic and other motives of a social and moral character are also potent. Hobhouse (4) believes that if peace at the end of the present war in Europe could be settled on the basis of the right of each population to choose its own allegiance or independence, carrying out Green's view that "will and not force is the true basis of the state," permanent peace might ensue. Unfavorable to this hope is the reaction during the past two generations from belief in reason, law, and humanity to faith in impulse, self, will, and power—characteristic alike of literature, art, philosophy, and sociology. The danger is that settlement will not come on a rational basis, but "in the rough and tumble of forces, or through a give and take imposed at the last by common exhaustion," with desires for *revanche* and a continued armed truce as consequences.

The psychological effects of war are also reported. Messer (7) finds that in war mass action dominates, the individual sinks in importance, and cultural activities are less valued. Moral virtues weaken in war time; lies and deception by officers and newspapers become prized means of strategy. Ordinary sanctions of law and morality are disturbed, and military discipline furnishes an incomplete substitute. Ethical theories based on egoistic hedonism or on the endeavor for self-preservation find their refutation in war time when duty, honor, and the desires to win and to help others are frequent motives to action. Patriotism unifies men. Schultz (12) asserts that conflict in battle does not ordinarily engender feelings of personal hostility, a statement also made by Crile (2) and Messer (7). Schultz says that it is hard, when secure oneself, to shoot down an enemy that is near by and unsuspecting. Enemies at a distance are viewed as a tactical whole, and the personal relation disappears. Bitter hostility may arise when one is in an exposed position, or making a mighty effort to gain ground, or in rear guard action and forced retirement. In the latter instances hostile emotions are due in part to the sight of wounded and helpless comrades that must be left behind. Dr. Crile's book (2) is particularly of interest on account of its descriptions of the mental states of soldiers, refugees, prisoners, and wounded whom he observed in the war zone after the battle of the Marne. Fatigue was so intense that soldiers actually slept while they were marching. The wounded were totally apathetic. In the excitement of charges the men were insensible to wounds, in a condition bordering upon ecstasy. The mechanistic philosophy and psychology are crude. Under the term "action patterns," instincts, habits, sentiments, customs, and beliefs are indiscriminatingly referred to, and the inheritance of acquired characters appears to be taken for granted. Schinz (11) gives a review of the literary works that were attracting most attention in France during the decade before the war. Most of these disclose remarkably serious moral and religious attitudes. The conclusion follows that "the splendid spirit shown by the French youth in the war is no miracle, but is only a normal result of the thoughts and aspirations of the France that was in formation in 1914."

From writers whose sympathies are strongly with one of the opposing sides in the present war, heat rather than light is to be expected. This may not, however, render their contributions less interesting. Riehl (10) compares the present war to the war of liberation in Fichte's time, and believes that it is a fight for national independence. The struggle is giving the nation self-mastery and a deeper self-consciousness, and it is effecting a closer unity between different social classes. The enemies of Germany have brought on the war, actuated by motives of economic hostility and desires for empty fame and *revanche*. Prince (9) combining conceptions found in McDougall's *Social Psychology* with suggestions from the Freudian school and his own experience with pathological cases, reasons that the mind of the present German Kaiser must be dominated by a fixed idea of his own divine right accompanied by an abnormal development of the self-regarding sentiment. This is aggravated by a phobia—fear of social democracy—suppressed in his subconsciousness but influencing his conduct. Durkheim (3) and Maxwell (6) charge the Germans with an exaggerated nationalism that places their State above international law, civil society, and all ordinary moral sanctions. This, in Maxwell's opinion, has resulted in a collective criminality in their relation to other nations. Durkheim (3) attributes this exaggerated nationalism to "a morbid hypertrophy of the will," a "kind of will mania," which has led the nation to try to impose its will on the rest of the world regardless of physical and moral impossibilities. From this "will attitude" has developed a system of ideas—exemplified in the philosophy of Treitscke and others—which has taken possession of the German conscience [consciousness?] and driven out all opposing ideas and sentiments. Whether a whole nation may become affected by a collective criminality or mental morbidity is a question which transcends its reference to the present war; it is an interesting problem for social psychology.

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RELIGIOUS PSYCHOLOGY

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Webb's book (8) contains the substance of a course of lectures, the Wilde Lectures on Natural and Comparative Religion, delivered at Oxford in 1914. It is a criticism of those theories of religion called by the author group-theories, as they are set forth by French sociologists, chiefly Durkheim and Lévy-Bruhl. The author's fundamental objections to these theories are that they must inevitably end in regarding religion, "as something illusory, and destined to perish in proportion as general knowledge of the world increases" (173, 181), and that they "do not do justice to what we usually mean by individual or personal religion." It does not appear clearly that Durkheim's view necessarily leads to the belief in the ultimate disappearance of religion. This, is, however, without doubt the outcome of the conception of Lévy-Bruhl.

The most pointed, successful, and valuable parts of the book are the early chapters in which Lévy-Bruhl's sharp separation between the prelogical and the logical mind is shown to be illusory. The demonstration of the inadequacy of that author's understanding of the Law of Contradiction (which according to him does not regulate the thinking of the savage) and of the mistake he commits in regarding the Law of Participation as differentiating the civilized from the savage, is entirely convincing.

The author is at pains to show that there is in religious experience an unveiling of the true nature of Reality to which science cannot attain. This is, of course, no new affirmation, and nothing of particular interest is said regarding this affirmed cognitive function of religion. The treatment of the relation of social to individual religion is also markedly barren. This book is obviously the product of a finely trained mind, but perhaps of a mind too saturated with traditional philosophies to appreciate fully the significance of the scientific work of the French sociologists.

Stalker's small book (7) is composed of quite popular and startlingly ill-informed lectures delivered at Richmond and Auburn Seminaries. The book is not a psychological study of religious life, but of mental functions, including a chapter on the senses and one on conscience. It is mentioned here for the benefit of those readers of the BULLETIN who may like to know what is taught in certain theological seminaries under the name of "Christian psychology."

What Should I Believe? (3) is the third volume of a series of short books in which Professor Ladd sets forth in simple language for the educated layman, the theoretical and practical conclusions to which his long-protracted studies in philosophy and psychology, and his experience of life have led him. The present volume ends with a chapter on "The Faiths of Religion," that opens with the words, "the psychology of faith is prepared to make the most important contributions to the understanding of the phenomena of religion, whether as a personal life or as a higher development." That chapter discusses the nature and function of religion in the light of its universality and of its relation to the intellect and to the emotional life. He argues, "not only the advantage, but also the duty of securing and cherishing the faiths of religion." "The Object of the faith of religion is God." Even the lay reader might complain of the vagueness and the lack of freshness of these pages.

What May I Hope? (4) belongs to the same series as the preceding volume. It is an inquiry into the sources and reasonableness of the hopes of humanity, especially the social and religious; and includes a chapter on the "Hope of Immortality." It is similar in its general purpose to the preceding volume, and is open to the same critical remarks.

Mainage's ten lectures (6) delivered before the *Institut Catholique de Paris* were written with an avowedly apologetic purpose. Conversions are regarded as a means of proving both the action of God in man's soul and the truth of Roman Catholic Christianity. The respective share of the intellect, the will, and the affection in conversion is successively considered. In the eighth lecture, the subconscious, as used by William James in his explanation of sudden moral transformations, is considered and rejected. The analysis of conversion shows, according to our author, that superhuman force acting with a definite intention is apparent in conversion. That force is God. The purpose of God is the increase of the Roman Catholic Church. Conversion among Protestants is a thorn in the flesh of the author. That is no doubt the real reason why only conversions within or to the Church of Rome are taken into account.

One will find in this book all the qualities of style and learning characteristic of the best Roman Catholic apologetic literature, and, I think, none of the qualities that befit the work of a man of science. It is not surprising, therefore, that the *Maître en Sacrée Théologie* permitted the book to go forth with the declaration that it contains "nothing contrary to faith." We owe thanks to the author, however, for a very carefully made and, as far at least as members of the Roman church are concerned, very full list of autobiographical documents.

The Yoga system (10) is a first attempt to set forth systematically, in the interest of a definite ethico-religious end, certain methods of mind-control. It is truly surprising how effective are some of these empirically evolved methods of "meditation" and "concentration." Their general nature and the mental states they induce are similar in essential particulars with the practices of Christian mystics in their strivings for union with God. The students of the psychology of religion will add their thanks to those of the historians for the first translation in a modern language of these curious methods of attaining the goal of life as it presented itself to sages of old India.

It is a matter for serious regret that the *J. of Relig. Psych.* should publish so few articles possessing qualities which would recommend them to the attention of the psychologist.

In a paper on the Nativity (2), President Hall continues his study of the psychology of Jesus, soon to appear in book form. The brilliancy, the fertility of imagination, and the varied knowledge which characterized the preceding studies are equally conspicuous in the present one. I can imagine a reader complaining that the rapid and well-nigh incessant shifting of many lights make it difficult for him to keep his mental vision properly adapted. Dr. Hall is not concerned with questions of historicity; his prime problem is as to how men came to believe the things of Christianity. Historically false beliefs may possess far deeper truths than those that are not false. It is the business of the psychologist to uncover these deeper truths. Regarding Luke's miraculous story of the Nativity, the psychologist of the folk soul can say "with a fullness of conviction that criticism can never give, and that the old faith never knew, that Jesus was veritably conceived by the Holy Ghost and born of the Virgin Mary." The final expression of the meaning of the birth-story of Jesus is striking. The incarnation is represented as God's homecoming to the soul of man. "The lure of the fairest of earth's daughters only typifies his homesickness." "God's homecoming commemorates man's coming to the glory and strength of his maturity."

The main purpose of Ellis (1) is to determine the comparative strength of the desire for three kinds of immortality: the personal, the plastic (continuation in one's descendants), and the influential, and the relative value of these for moral conduct. This is accomplished by means of a survey of beliefs and practices referring to death, burial, and ghosts.

The outcome of this survey is that the desire for personal immortality is weaker than the desire for the other forms of immortality, and that this is fortunate, since interest in our descendants is vastly more important for society than belief in our own continuation after death. With these conclusions few will disagree, though some may not grant that they follow from the facts adduced in the paper. One notes a probably excessive influence of the Freudian theory upon the author. It appears in particular in his opinion that the most fundamental factor in the origin of the belief in immortality is the desire not to die. One would like to know why he has not even mentioned the Spencer-Tylor theory, according to which a direct *perceptual* experience (apparitions in dreams and otherwise) is the cause of the belief in ghosts. There are other omissions regretable in this otherwise scholarly and interesting piece of work.

In the first part of his article (9), Wobbermin restates his understanding of the *religionspsychologische Methode*, as set forth at length in his recent book (reviewed in the BULLETIN, 1915, 12, 462–467), and disposes of some objections made by Wundt. The discussion is about the respective merits of the historical and the genetic methods, and their insufficiency for the study of religion. It is claimed that the author's own method does not suffer from the defects which are said to limit the usefulness of these methods in their application to religious life. The second part turns out to be mainly a review of Otto Gruppe's theory of the origin of religion: religion was founded in the interest of the ruling classes for protection against the unsatisfied, disinherited classes. It seems hardly necessary at this late date to consider that theory seriously. The author finds it untenable on many grounds. One of them is that it supposes that the earliest societies were without religion. This unnecessarily long article closes with a third part entitled *Die Moderne Urmonotheismus-Theorie*. Andrew Lang is named as the originator of the modern form of that theory (the universal High-God theory). The review of the evidence leads the author to two conclusions: (1) The beliefs in God and magic and mythology seem originally to have been undifferentiated. (2) The extant primary tribes do not exhibit religion in its purest form. I do not think the first of these conclusions, when properly understood, will be contested by any one. The second remains an object of contention.

Lehmann (5) reports upon five answers to a very comprehensive questionnaire (46 questions, many of them divided into 2 or 3 parts, on prayer and orison). Questions and answers are offered by the author as information regarding a possible method for attacking the "central problem of modern culture," *i. e.*, the actual relation maintained by man with "God" or the "Universe." Detailed and exact inquiries of this sort are to be commended, for we may hope to gain from them reliable information regarding the really essential problems of religious life.

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MYSTICISM

BY JAMES BISSETT PRATT

Williams College

"It has become a platitude to speak of a mystical revival," says Mrs. Hermann (4); "but so far it has been a revival of interest in mysticism rather than of mysticism itself." That there has been at least a revival of interest in mysticism is illustrated by the number of recent books upon the subject. Of these Mrs. Hermann's is one of the best. There is no showy display of erudition in this book but it is perfectly plain that the author is widely read in the writings of the mystics and that she has thought long and clearly over her reading. Her style also is pleasing and her judgment almost invariably sound. Few writers have presented mysticism in more attractive form, and yet she loves the truth too well to be blind to the faults of the mystics or the dangers to which they expose themselves. Naturally, not all aspects of her subject attract her equally; and it is the psychology of mysticism which interests her least and in which her book is least satisfactory. In fact her reading upon this branch of her subject is notably limited, and she seldom attempts anything that can be called a psychological analysis of the mystic experience. And yet her description of "Introversion," "Quiet," and "Contemplation" in Chap. V, will be found very helpful in understanding the inner nature of mysticism; and the sketch that she draws of it here and throughout her volume should act as a much needed corrective to the conventional formula of a mechanical process presented in Evelyn Underhill's writings, which has done so much to fashion the popular view of mysticism. Mrs. Hermann, indeed, is consciously opposing Miss Underhill's presentation and never loses an opportunity to attack her artificial formula of the mystic way, into which all the mystics willy-nilly have to be packed; her somewhat amusing directions for the deliberate cultivation of mysticism by gazing at tabby cats and other equally unlikely objects; and above all her suicidal anti-intellecualism and falsification of history. Particularly in adjusting the rival claims of intellect and intuition does Mrs. Hermann show her admirably balanced judgment. On the whole she has written a book of real value both to the beginner and to the advanced student of mysticism.

Mrs. Hermann's book is subject to one self-limitation of considerable extent. She confines her consideration almost entirely to the Christian mystics; and in fact for her mysticism seems at times to be almost identical with intense love for Christ and a certain immediate knowledge of God through Christ. A. B. Sharpe (5) has still further limited the mystical field. For him mysticism means orthodox Catholic mysticism and nothing else. His book is written entirely from the Roman point of view, and its aim is chiefly to show how true mysticism is to be distinguished from spurious and to prove that true mysticism is "either supernatural or nothing." There is, indeed, a natural mysticism, which is practically identical with a certain kind of theology, but it is not really mysticism in the strict sense. A genuine mystical experience, according to our author, is an immediate apprehension of a Supernatural Presence. From this it will be apparent that the chief interest of the book is theological rather than psychological. Mr. Sharpe does indeed give us a chapter on "The Psychology of Mysticism"; but this chapter contains none of the excellent psychological analysis to which other Catholic writers such as Poulain, Ribet, and Lejeune, had accustomed us. Instead we find merely a rather flabby argument to show that though the mystical experience demands no special psychological powers or miraculous functions, it cannot be explained without presupposing the presence of the supernatural object. And here, of course, the author is referring to orthodox, Catholic mysticism. The experiences of the spurious mystics—such as Boehme, Molinos, Madame Guyon and in short all heretical "mystics"—may easily be explained with no such help, and the author hands them over gladly to James and the psychologists.

Probably the most useful thing in Mr. Sharpe's book for the majority of readers is the excellent translation of the *Mystical Theology* of Dionysius which constitutes the last chapter. This work had indeed already been translated, by the Rev. J. Parker (1895), but Mr. Sharpe's rendering is much more free and much more readable.

A better and a very much more liberal book is Professor John Wright Buckham's (1). In fact Professor Buckham is so liberal in the use of the term that by the time he reaches his final chapter mysticism comes to be identical with almost everything worthy of admiration. Fortunately this extreme use of the word is confined to the one chapter, and in the earlier parts of the book the term—though still vague—is given a much more restricted and definite meaning. In the introduction it is defined as "the certainty which grows up in the presence of mystery," but throughout the book the term is delimited so as to mean a distinctly religious phenomenon. Under the influence of Miss Underhill, the first chapter is devoted to the stages of the Mystic Way; but these stages are interpreted and translated into "modern equivalents" in such a manner as to avoid the sense of mechanical process that invariably results from reading Miss Underhill's descriptions. It cannot be said that Professor Upham has made any contribution to the psychology of mysticism nor has he aimed at doing so. His book is rather a very successful attempt to interpret mysticism to the busy man and to indicate its place in modern life.

Dr. R. H. K. Gill's small volume (3) is an attempt on the part of a clergyman who has read James, Starbuck, and a few other writers, to impart some of the facts of religious psychology to those who have no time to read the larger and more technical works. Dr. Gill's book certainly has the merit of brevity, but it is doubtful whether it is worth anyone's time to read it.

For the purpose of the psychologist by far the most interesting and valuable of the books under review is Flournoy's *Une Mystique Moderne* (2), for he presents us with the case of a deeply religious ecstatic, whom he had under more or less direct observation for serveral years, and who under his direction wrote careful accounts of her various mystical experiences. These documents from the hand of the mystic herself form the bulk of Flournoy's report, and though his fifty pages of commentary at the end are helpful, the chief value of the work is to be found in the mystic's own descriptions. That Mlle. Vé (for such is the assumed name by which she is called in the report) is a genuine mystic there is no good reason to question—in spite of Dr. Jean Philipp's attempt, in the *Revue Philosophique* to deny her that title. She differs indeed from what one might call the classical mystics in certain respects, but these are not essential to her mysticism. She has much greater knowledge than they of psychology, she makes use of no ascetic practises, she has no theological revelations. In psychological analysis she rivals St. Teresa, and she combines with it a surprisingly objective way of treating her own most sacred experiences. Her style, moreover, though a trifle diffuse, is very attractive. When one adds to these facts the further consideration that the story of her spiritual life is itself filled with interest and at times with pathos, it is hardly necessary to say that we have here a document of considerable value not only for the technical psychologist but for every student of human nature.

As the result of an outrage of the hands at a villain, Mlle. Vé was subject from her eighteenth year on to violent attacks of erotomania, which, in a religious and noble disposition such as hers, resulted at times in something approximating double personality. Her position as the head of a Protestant institution for girls made the inner struggle the more terrible, and her celibate condition both intensified it and produced in her a sense of loneliness and a longing for sympathy. Moral scuples made her give up her one male friend—a loss which increased her desolation. It was shortly after this that her first semi-mystical experiences began. She found at times the sense of presence of a "spiritual friend" comforting and strengthening her. To this, however, she attributed no specially religious value: but its place was soon taken by a new experience which to her was beyond question contact with the "divine." This was the first of a series of thirty-one ecstasies, lasting for a period of nearly two years. Her description of them is minute, and throws as much light on the nature of this experience as anything in mystic literature. In many ways it confirms the testimony of the classical mystics; at the time of occurrence it is impossible to doubt the divine nature of the experience; it is ineffable, conveying the sense of incomparable mystery, yet also meaning, somehow, the presence of the "*Au dela*," and bringing with it a certain joyous vital energy, and a great *light.* To Mlle. Vé's surprise the "divine" as thus experienced was always impersonal; and to her sorrow, the experience was so incommunicable to others that at last it lost most of its value in her eyes, as her religious aspirations came to be less centered in her own joy and more in the service of others. Only one of her ecstasies has any apparent relation to any sexual experiences; but the popularity of erotogenetic theories, and the dominance of Freud and Jung in contemporary thought have induced Professor Flournoy in his comments to give an altogether undue prominence to this aspect of the case. "Libido" and the "incestuous tendencies" of psycho-analysis are given a kind of perfunctory importance; but it is plain that Professor Flournoy has really little confidence in this sort of thing, and in fact the terms themselves, when he has finished defining and refining them, become quite meaningless. There is, of course, no doubt that sexual elements were mixed up among other bodily feelings in some of Mlle. Vé's ecstatic experiences; but it is hard to see how any sane reader of her case could regard them as constituting the dominant factor.

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RELIGIOUS EDUCATION

BY E. S. AMES

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Cope's book (1) is designed to afford guidance to those who desire to study systematically religious education in the family. It is written for parents, teachers of church classes and others dealing directly with the practical problems. Without making any attempt at a critical reinterpretation of religion, the author makes it evident that it means for him social idealism rather than dogma, and this is largely mediated to the child through the family. "The family is the soil of society, central to all its problems and possibilities." The home is the form of the family life and is deeply affected by the social changes which are now going on. The industrial revolution, the drift of population to the cities and the consequent changes in the mores such as are registered in a slackening of Sunday observance, church attendance, and various formal services require new methods of religious instruction.

The author realizes that the religious influences of the family are most effective when they relate to the natural interests of the child. In his play arise questions concerning cheating, unfair play, unkind words and other moral situations which give opportunities for direction and emphasis without strain or formality. This naturalness is kept to the front in the discussions of a variety of subjects. Chapters are given to Stories and Reading, The Use of the Bible in the Home, Family Worship, Sunday in the Home, and the Ministry of the Table. Four chapters are devoted to Moral Crises. Here are treated anger, quarrels, fighting, lying, dishonesty, teasing and bullying. The parent is constantly cautioned not to take matters too seriously from the adult point of view. For example, "children's fights are not as cruel as they seem to be; even bloodshed means little either of pain or injury." "That fight may have been precisely the same thing as a croquet game to his sister, or any test of skill to his big brother, or a business transaction to his father." The fight may, however, give us our chance to aid the boy to a sense of the qualities that make the true fighter in life's greater conflicts.

At the end of each chapter is given a well-selected list of readings for further study and reading. There are also topics and questions for class discussion. In an appendix are given detailed suggestions for the use of the book in classes and also a bibliography of the subjects treated.

The little treatise by Runnalls (3) is a statement of the methods used by the author in the application of psycho-therapy in his parish. Like the Emmanuel movement, of which it may be said to be an expression, it has a two-fold purpose, to heal the sick, and to do this in a way to conserve the church against the inroad of the new cults of healing. The author's confidence in the validity of suggestion as a means of curing the sick seems to rest more upon biblical authority than upon psychological and empirical grounds (p. 16).

The technique of the class procedure is given in detail. Hymns, prayers, scripture readings, periods of silence, of study, etc., are carefully described. Emphasis is put upon the selection of each item to "produce a sense of perfect harmony." "It is suggested that public discussion be at all times repressed." The experience shows that people can be greatly helped by the positive, encouraging influence of a class like this. It has even better psychological and practical justification than this book reveals. The very brief bibliography on "Nervous Troubles" and "Sex Hygiene" might well be extended. The kinship and tendency of such movements is further reflected in the mention of so many books on "Mysticism."

Hartshorne published in 1913 a volume dealing with the psychology and pedagogy of worship. He has since published a book of worship for the use of church schools, containing songs, prayers and various forms. This *Manual* (2) is designed for the use of the leaders of the services of worship in such schools.

Worship is viewed as an aid to the formation of character, that is, to making "all one's acts and attitudes the expression of some self-chosen purpose to which all else in life is subordinate." Worship is treated as a means of unifying the details of instruction into this purpose. The Christian ideals are held to be essentially those arising in the family, namely, "faith, hope, and love, loyalty, and gratitude and reverence." A psychological analysis of these attitudes is given, following Shand and Stout, and the services of worship are designed to express and strengthen them in the children. The festivals of Thanksgiving, Christmas and Easter are made the occasions in the common social life for the use of appropriate services expressing the sentiments of gratitude, goodwill, reverence, faith, and loyalty.

Each order of worship is built around one of these topics or some phase of it. The music, readings, stories and prayers relate to this central theme. The stories are drawn from a wide range of experience and are given as suggestions of the variety available for the purpose. "Cases of child labor, accounts of hospital work, fresh-air work, milk stations, private-school life, the trials of the 'poor little rich children' are rich in possibilities." Well-selected bibliographies are given for all phases of the services including music for the organ.

These services and the directions for their use have been worked out in the Union School of Religion, New York, of which the author is principal, and they bear throughout the marks of a scientific background and of a social point of view.

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SPECIAL REVIEWS

Social Freedom. A Study of the Conflicts between Social Classifications and Personality. Elsie Clews Parsons. New York: Putnam, 1915. Pp. 106.

Individualism dies hard, even though social psychology furnishes little or no foundation for it. For social psychology shows beyond question that social control extends more or less to all social relationships in all human groups, and that as those relationships become more complex social control becomes increasingly necessary, if social order is to be preserved. However, the book before us is ethical rather than psychological. It makes no serious attempt to penetrate into the meaning of socio-psychic processes. Rather its thesis is simply that personal relations cannot be standardized; that each relationship, if considered at all by society, will have to be considered in itself. This thesis would doubtless be true if social control worked merely through legal machinery; but control through public opinion, social standards, and the like, is an entirely different matter. There is as much need of standardizing personal relations in society as any other sort of relations, and we know of no human group in which they are not more or less standardized by the subtler agencies of social control. A single quotation will sufficiently indicate the trend of Mrs. Parson's argument.

"Recognizing its limitations, will not society begin to regard sex relations as purely private relations, no more its business than friendships? In early culture, friendship, we are to see, is itself an affair of covenent and ceremonial, a public relationship. With us it is not a community concern. Time will be, one ventures to predict, when the sex relationship likewise will come into its rights to privacy, to freedom from direct community control."

Charles A. Ellwood

University of Missouri

The World Crisis and Its Meaning. Felix Adler. New York: Appleton, 1915. Pp. 233.

Professor Adler's new book is based on a series of addresses delivered by him shortly after the outbreak of the war. He seeks, first, to expose the fundamental causes of the war, secondly, to examine the hitherto inadequate means put forward for the prevention of such calamities, and, thirdly, he proposes what he counts to be more hopeful methods. The prime causes of the war he finds partly in science—in the fact that the extraordinary development of the means of destruction prompts the desire to use them: the machine gun (he says) in its reaction on the military system which creates it being the counterpart of the machine loom in its reaction on industry, which it has helped to dehumanize. But deeper still is the spirit of nationalism, which has been accentuated instead of reduced by the growth of means of communication. The different national cultures, ideals, ways of looking at things, create mutual dislike and jealousy and the wish to set themselves up, each as the pattern for the world. Nevertheless Dr. Adler brands as folly the cosmopolitanism of the pacific movement, and declares that nationalism, far from being ignored, ought rather to be encouraged, but with a different conception of its significance. What is needed to purify patriotism is a recognition of the preciousness of nationality, and of the necessity, without exception, of all the national types to complete the ethical economy of life. In short, he preaches a spiritual democracy of nations.

But this cannot, he urges, be realized in practical affairs at present. The measure and kind of civilization reached by the various nations is so different (as compared with the homogeneity of America) that a United States of Europe is as yet an absurdity. Nor has Dr. Adler any use for an international tribunal as a panacea—for this again is based on a false analogy, there not being, as in the case of an ordinary court of law, millions of disinterested parties to ensure impartial judgments and the doing of justice. And an international police, if opposed in the performance of its duty, would merely be an army contending on behalf of the neutral nations against the prime combatants; it would be war, that is to say, under another name. Nothing, he insists, can cure the war trouble in the long run except the spread of a scientific understanding of nationality and a long and persistent education of all peoples in the worth of one another's modes of thought and ideals.

In the same volume are included two essays giving the author's ripest judgment in regard to the achieving of economic justice—entitled "The Moral Awakening of the Wealthy" and "An Ethical Program of Social Reform." A final and very suggestive chapter deals with "Ethical Development extending throughout Life," and pleads for a spiritual purpose and discipline proper to each stage from childhood to old age. The book altogether is not a large one, but it may be doubted if so much mature thought about hard problems, and so much fertile incitement to further thinking and achievement has for a long time been compacted into a work of its extent.

George E. O'Dell

Religion and Magic. Karl Beth. Leipzig: Teubner, 1914. Pp. xi+238.

This book is in substance an attempt to demonstrate the independence of religion from magic with regard to its origin and its nature. In the first chapters are discussed the theories of Frazer, Marett, Preuss, and Vierkandt, in so far as they regard magic as a forerunner of religion, either because magic passed into religion, or because the failure of magic became the incentive to the development of religion.

According to Beth, who in this follows recent authors, certain original forms of magic are independent of any idea of power, be it animistic or not; while the original religious reaction was brought out by the recognition of the presence of a supernatural and suprasensible, non-personal power, distinct from the forces belonging to the human and animal world. Belief in the existence of a power of that description is found among most of the primitive populations; it is the Mana of the Melanesian, the Wakonda of the Sioux, the Manitou of the Algonquin, the Mulungu of the Bantau, etc.

In the presence of this power, man, according to our author, assumes not the attitude characteristic of magic, but that of religion, *i. e.*, the attitude of awe and of humble dependence, leading to prayer and worship (208, 211). This power need not be, and originally is not, conceived as personal. Yet, the feeling of veneration which it induces leads to prayer and worship (200, 211, 212). Whether man's behavior is to be called religion or magic depends not essentially upon the nature of the power with which he thinks himself in relation, but upon the kind of feeling-reaction he makes to it (212).

It is an error, thinks our author, to suppose that the fear of particular phenomena led man to the belief in the suprasensible power; fear was a very secondary motive. Nature, particularly perhaps the night sky, awakened in man an astonished awe and a sense of weakness. These were the dominant emotions of the early reaction (p. 227). Later on, with the appearance of gods and demons, a second religious level was reached—second, but not necessarily higher—which in most lands obliterated, at least for a period, the first level.

In the magic attitude there is no humility, no feeling of dependence; but rather a deliberate, self-reliant seeking of a particular advantage through definite means. "Magic and religion are opposites; they cannot be united" (222).

The readers of recent anthropological literature will find very little that is new in Beth's volume and probably also little to criticise beyond the slurring of the difference which, it seems to me, exists in the conception of powers calling forth on the one hand awe and a sense of weakness and nothing more; and, on the other, these emotions and in addition prayer and worship. I should insist that any power eliciting prayer and worship is thereby shown to have been, at the time, conceived of as personal. It is, however, not the fact that a power is personal which alone determines the kind of relation which man is to maintain with him. A personal power becomes an object of magic when instead of appealing to him by what I may call here psychological means (expression of submission, of humility, prayer, offerings, etc.), man thinks himself able to coerce him by other means.

The genetic independence of religion from magic—the main thesis of our author—is affirmed and defended in a book published by the reviewer a few years ago, but apparently not known to Beth.

James H. Leuba

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The Inequality of Human Races. A. de Gobineau. (Trans. by A. Collins; Introd. by O. Levy.) New York: Putnam's, 1915. Pp. xv+219.

The present war has caused a flood of translations of books well known to students of social thought. In most cases, these translations have scarcely been justified, if we view the matter from a strictly scientific standpoint. Such is certainly the case with this translation of de Gobineau's well-known work. Written in 1853, it contains little or nothing of scientific value for the present. It is, of course, the classical exposition of the theory that social life and civilization are dominated completely by the factor of race, and that environment, education, religion and moral standards count for little or nothing. The book has, however, historical value, and as such may possibly fill a useful place in our libraries.

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NOTES AND NEWS

The present number of the Bulletin dealing with social and religious psychology has been prepared under the editorial direction of Professor J. H. Leuba, of Bryn Mawr College.

The Johns Hopkins Press will shortly commence the publication of a series of translations and reprints with the general title of *Psychology Classics* under the editorship of Professor Dunlap.

At the Ohio State University E. Leigh Mudge has been appointed instructor in psychology.

The death is announced of Dr. V. J. J. Magnan, a leader in French neurology and psychiatry.

Plans are being made to begin a *Journal of Applied Psychology* under the direction of G. Stanley Hall, J. W. Baird, and L. R. Geissler.

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